EXPLORATION OF REVENUE SOURCES FOR FINANCIAL SUSTAINABILITY OF A PUBLIC UNIVERSITY IN KWAZULU-NATAL: A CASE STUDY OF DURBAN UNIVERSITY OF TECHNOLOGY

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DECLARATION

I, Xolani Ngcobo, declare that this dissertation is a representation of my own work in conception and execution. This work has not been submitted in any form for another degree at any university or institution of higher learning. All information cited from published or unpublished works has been acknowledged.

	05 May 2021
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APPROVAL FOR FINAL SUBMISSION

	20 May 2021
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DEDICATION

This thesis is dedicated with love to my late mother Ngakhephi Ngcobo as an emblem of victory, “Yes I made it mom”.

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I raise my hand and express special gratitude to my Lord, for He loves and keeps me going on.

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ABSTRACT

Financial sustainability of public universities has been the predominant topic in South African universities since the start of the 2015/16 student protests and the proposal of fee-free education. A concern to universities is that their revenue structure is inadequate for proposed tuition fee scrapping as the government is not consistent in awarding grants. On the other hand, revenue derived from third-stream income is growing at a steady rate. To meet sustainability goals as per the universities' strategic plans, diversification of revenue sources has been the adopted financing model used widely in the South African universities. However, different countries have different financing practices for higher education; while some rely solely on government funding, others rely on tuition fees and others on third-stream income. This study intended to recommend revenue generation strategies that may ensure the financial sustainability of public universities using the Durban University of Technology as the subject of the case study.

The study used a quantitative research approach which included two open-ended questions. The quantitative questions explored funding challenges, evaluation of each income stream, possible recommendations for revenue sourcing for financial sustainability and the existing revenue sources. The two open-ended questions allowed respondents to express their opinions on the subject of this research. The research followed a positivism research philosophy with a deductive approach. The quantitative data collected was analysed using the Statistical Package for Social Sciences (SPSS) (version 26®) and Microsoft Excel, respectively.

The study showed that DUT is using a diversified revenue structure, inclusive of first-stream income, second-stream income, and third-stream income. The findings indicated that revenue sourcing is a financial challenge for DUT. This meant that their revenue generation strategies are not adequate. Recommendations suggested by the respondents included developing strategies to enhance third-stream income, debt collection on owed tuition and improving the university throughput rate.

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LIST OF ABBREVIATIONS

CCPE	Centre for Continuing and Professional Education
CFO	Chief Finance Officer
CHE	Council on Higher Education
Covid-19	Coronavirus Disease 2019
DHET	Department of Higher Education and Training
DIT	Durban Institute of Technology
DUT	Durban University of Technology
EDU	Educational Development Unit
EGF	Externally Generated Fund
FREC	Faculty Research Ethics Committee
HDC	Higher Degrees Committee
HoD	Head of Department
IASB	International Accounting Standards Board
IFRS	International Financial Reporting Standards
IGF	Internally Generated Fund
KMO	Kaiser-Meyer-Olkin
KZN	KwaZulu-Natal
NDP	National Development Plan
NRF	National Research Foundation
NSC	National Senior Certificate
NSFAS	National Student Financial Aid Scheme
OECD	Organization for Economic Co-operation and Development
RDT	Resource Dependency Theory
SEM	Structural Equation Model
SPSS	Statistical Package for Social Sciences
STATS-SA	Statistics South Africa
UCCF-SA	University Council Chairpersons Forum South Africa
USAf	Universities South Africa

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CHAPTER ONE

INTRODUCTION

1.1 Background of the study

The latest economic, political, and social crisis triggered by the campaign “fees-must-fall and free education” caused concern to the universities and government and threatened financial sustainability (Commission of Enquiry into Higher Education and Training 2017). Most sectors in the South African economy are facing a financial sustainability crisis caused by the increasing demand for public goods, while inflation proliferates (Organization for Economic Co-operation and Development (OECD) 2020). Such sectors include the government revenue sector, education, manufacturing, retail construction and mining (Mathe 2020). Among the practices of reducing the economic burden on the state, the government has used tax increments and other fees charged to the public creating a burden for its citizenry (Loewald 2018).

The financial pressure underlying the South African economy has had a significant impact on higher education financing. While government grants for the poor are still available, the growing demand for higher education has not matched the available funding. Tuition fee increments have also made it difficult for the poor to afford higher education without government grants. This has created a vast inequality landscape for the South African population and put pressure on the universities. Due to limited government grants, students opt for debt, burdening the universities with a revenue collection crisis. Universities are busy trying to source additional funds to bridge the income gap created by these inequalities and insufficient government support. The free education crisis has become a hardship to the already strained university sector. At the same time, these underlying social injustices and inequalities could be improved through the free education ideology.

Universities’ financial sustainability is not just a South African concern. Countries worldwide are also faced with similar concerns in their higher education sectors, and there have been different practices across developing countries to promote

higher education. Gebreyes (2015) suggests that universities globally are concerned with the financial sustainability of the higher education sector. Government subsidies to universities in South Africa keep declining, and every year there is student unrest caused by the cost of education (Mlambo, Hlongwa and Mubecua 2017). This, in turn, has strained the financial sustainability of the universities. Universities are now competing for funding to ensure their sustainability through alternative funding sources (Basri, Razak, Hussin and Muhammad 2019).

Sazonov, Kharlamova, Chekhovskaya and Polyanskaya (2017) outlined that universities may not be possible to rely on government grants in the future. In developing countries, public higher education is mainly financed through income from research and private grants. This financing model is not possible in South African universities under the current economic situation. In essence, South African universities are mainly financed through government subsidies with a minimal reliance on income from research and private grants. Revenue generated from research and grants is the least income from South African universities' revenue sources (STATS SA 2020). The pressure of addressing previous inequalities and imbalances in South Africa are critical factors behind government interventions into higher education systems, and the government has encouraged public universities to source funds elsewhere.

There have been numerous recommendations and discussions on revenue sources for higher education. However, the government still plays a pivotal role in managing the financial structure of universities through direct and indirect contributions to universities. University education in South Africa was made free from 2018. This is not complete free access to university as it is controlled and managed by the government through the National Student Financial Aid Scheme (NSFAS). Thus, the government is paying the student tuition fees, and it is still an essential contributor to the financial sustainability of universities. This research focuses on financial sustainability as free education is not feasible in the long run; hence many researchers have argued that free education is not in line with financial sustainability (Basri *et al.* 2019; Gebreyes 2015).

There is a global concern about free education. Developed countries like Germany have successfully implemented free education, while countries like United States uses a student loan debt model (Goksu and Goksu 2015). In South Africa, a developing country, this is an economic crisis as the cost of offering tertiary education is expensive and keeps increasing. The South African Department of Higher Education and Training (DHET) (2017) outlined that the 2015/16 student unrest was reduced by the government implementing a no increment to fees to students from families earning below R 600 000 per annum. According to Muller (2018), the implementation of free education, through NSFAS by students coming from families earning less than R 350 000 per annum who gain entry to universities from 2018 onwards, also contributed to reducing student protests. Student protests continue year after year, and this puts pressure on the need to accelerate resources for the implementation of free education and support those coming from low-income families. While these needs are being attended to, the increase in student enrolments has a negative effect on attempts to fulfil these needs.

As government subsidies to universities are uneven, universities are forced to address their sustainability goals with limited resources. This decline in state subsidies for universities has put pressure on universities to seek alternative funds to support their activities. These highlighted issues have provided the impetus for this research to be conducted and to recommend possible solutions.

This section provided the background to this research. The next section discusses the problem statement arising from this background.

1.2 Problem statement

The contribution of tertiary education to advancing a country's development is significant (OECD 2020; Pouris and Inglesi-Lotz 2014; Badenhorst 2019; Baijnath 2018). The World Bank (2018) attests that utilising inventive techniques to execute innovation for ventures or institutional constructive resource allocation relies on well-educated and trained personnel with a solid tertiary education background.

The cost offering of higher education has constantly been increasing year after year. The funding pool (revenue sources) has been inconsistent, considering the students' debts disclosed every year by universities, in 2021 reaching approximately R 14 billion (Naidu 2021; Macube 2021). South African universities are confronted with the financial sustainability crises, as universities are pressured to increase institutionally based revenue generation through third stream income. Whereby collection of tuition fees are inconsistent due to increasing enrolment of a disadvantaged group of students. The increasing enrolment of the disadvantaged group of students has meant that the government is also pressured to maintain adequate subsidies to these institutions, which has consistently proven to be uneven. In South Africa, because of previous injustices and imbalances, the government has a significant role in funding education to accommodate everyone. It has become evident that, as the government is under pressure, universities need to increase their focus on the generation of income.

The formation of DUT by the merger of Technikons Natal and ML Sultan reduced the duplication of tertiary institutions and bolstered financial leverage (Daweti 2015; Ngcwamu and Teferra 2015). As much as DUT has been reported as a going concern as per the audit reports, however, the inconsistency of revenue sources is a cause for more significant concern for the university and poses a threat to their financial sustainability (DUT 2014; DUT 2018)

Revenue sourcing is a challenging topic, especially in public universities (Alstete 2014). The South African government's interventions to promote free education are uncertain, as there are no guarantees of financial sustainability. Recommendations for improving universities' financial sustainability usually require acquiring alternative means of financing universities' activities (Mitchell, Leachman, Masterson and Waxman 2018; Salvioni, Franzoni and Cassano 2017).

1.3 Aim and objectives

This research aims to investigate revenue generation strategies to ensure the financial sustainability of Durban University of Technology (DUT) in KwaZulu-Natal, South Africa.

To achieve the research aim, the following research objectives were set:

- To investigate DUT's funding challenges.
- To evaluate the effectiveness of each income stream as a reliable source of financial sustainability at DUT.
- To determine revenue generation strategies that will ensure the financial sustainability of public universities in KwaZulu-Natal.
- To evaluate the effectiveness of existing revenue streams at DUT.

To meet the above objectives, the following questions were asked:

- What are the challenges faced by DUT in funding?
- How does each income stream affect the financial sustainability of DUT?
- What are suitable revenue generation strategies for public universities in KwaZulu-Natal?
- How effective are the existing revenue sources in the financing of DUT?

1.4 Overview of the research methodology

This research is an exploratory case study using a quantitative research method and deductive approach. A positivism philosophical stance was adopted. The research is a cross-sectional study (Kumar 2019). The target population for this research included executive management, Head of Departments (HoDs), finance officers and academic lecturers from the accounting and management sciences clusters. Judgemental sampling, a non-probability sampling method, was used as the participants were chosen based on the researcher's knowledge and judgement of their expertise (Kumar 2019).

The research used Likert-scale type questions in a questionnaire that was administered to participants using online distribution channels. The objective was to ensure that sufficient information was generated from the participants. The

questionnaire ended with two open-ended questions. The data collection was timed to last 60 days. The research used Microsoft Excel and SPSS (version 26®), quantitative research analysis tools, to record the data and analyse the findings.

Due ethical processes were followed.

1.5 Value of the research

The contribution which this research makes is as follows.

- This research contributes to existing literature in the context of funding and financing of public universities in KZN.
- The study contributes to country and global trends in growth by evaluating streams of revenue that finance institutions of higher learning while trying to find a reliable source(s) that could be employed as a sustainable source of revenue.
- This research also contributes to the understanding of university operations, particularly financing, to the general public. This will assist in providing information that could, inter alia, assist in the recent implementation of free education, which the country cannot yet afford.
- This study may lead to a better understanding of financial sustainability and the degree to which public universities should diversify their revenue sources to reduce government interference in their funding sources.
- This research contributes to the discipline by providing a tool (that is, the questionnaire) for analysing the financial sustainability of the institutions of higher learning and their most important source of income to focus on to increase their independent wealth or sustainability.

The findings of this research may be instrumental in other ways. It may assist the university management in South African public universities by providing knowledge to ensure financial sustainability through revenue sources. Using the findings of this research, constructive analysis and conclusions on diversification of revenue sources could be an aid to respond to the financial viability of public universities. Similarly, other countries' public tertiary institutions and universities can use this study to guide their considerations of revenue diversification, which

has become imperative because of the changing dynamics of funding public universities globally.

Furthermore, Universities South Africa (USAf), the office entrusted for administering the advancement of tertiary education and training, including financing, may find the findings of this research useful in advising South African universities financing model. The government could even use it in decision-making on grants and subsidies to public universities.

Having outlined the significance of this research in the above section, the following section provides an overview of the chapters that make up this dissertation.

1.6 Overview of the chapters

This study is arranged into five chapters as follows:

Chapter one

This chapter introduces the context of the research, sets out the background of the research, presents the problem statement, the research aim and objectives, the underlying methodology and the significance of the study.

Chapter two

This chapter focuses on reviewing the existing literature on revenue sources in public universities, giving a theoretical, conceptual, and empirical overview of the literature on the revenue sources at public universities.

Chapter three

The chapter discusses the research methodology adopted in the study. The chapter discusses the design of the research, sampling procedure, the methods used for data collection, the design and distribution of the questionnaires, data analysis and the reliability and validity of the instruments used in the research.

Chapter four

This chapter presents and discusses the findings of the research.

Chapter five

The chapter provides the conclusion and recommendations arising from the findings and provides a brief discussion on the limitations of the study and suggestions for further research on the evaluation of revenue sources on public universities in South Africa.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

The previous chapter introduced this study by presenting the background to this research, the problem statement and outlined the research aims and objectives. To present the literature in the context of the research phenomenon under study, this chapter first discusses the relevant theories in the context of this study. Next, the context of tertiary education is provided after which the revenue structure of South African universities is discussed. The concept of financial sustainability is addressed, after which empirical literature is reviewed. A gap analysis is then provided and then the context of this study, DUT, is discussed. Finally, the conceptual framework underlying this research is presented.

2.2 Theories underlying this research

Theories in research are used to better explain or predict a research phenomenon and to give a better understanding of the surrounding research environment (Turner, Baker and Kellner 2018). An understanding of the research area guides the research process, and this understanding is guided by the identification of underlying concepts in the research paradigm which are called theories (Turner *et al*. 2018). This study reviews two related theories in the context of this study, the resource dependency theory (RDT) and neoliberalism theory.

2.2.1 Resource dependency theory

According to Coupet and McWilliams (2017), there is a growing desire for public servicing organisations or sectors to maximise profits. This is because there is a common understanding that profitable entities tend to deliver efficient services beyond what the government could do. These sectors include, among others, education and health facilities (Johansen and Zhu 2014). Governments have designed an economic model called quasi markets that attract the private sector to intervene in the effective delivery of public services (Lewis 2017). Coupet and

McWilliams (2017) argued that this model (quasi market) could be explained by the resource dependency theory (RDT).

RDT supports the possibility that organisational success and sustainability in the long run depend on resource availability, whereas control and access to those resources is the basis of power (Zehir, Findikli and Celtekligil 2019). This gives rise to the dependency and interdependency of organisations or persons to whom resources are transferred among (Hillman, Withers and Collins 2009). Dependency of public universities to government subsidies (resources) is an example of RDT. RDT is also highlighted by the diversification of revenue sources. Daviet (2016) outlined that the control and power sharing of higher education institutions is slowly being diversified from government support dependency to privatisation of power. Hence as government support to public universities keeps declining, the opportunity for privatisation and intervention of the private sector to manipulate control over public universities is slowly increasing (Akomolafe and Aremu 2016). This manipulation of control is an example of RDT.

RDT suggests that no organisation is truly independent. Directly or indirectly, organisations are dependent on each other, giving rise to a stakeholder relationship that influences organisational power and authority (Davis and Cobb 2009; Delke 2015). An organisation’s resources come from different sources; thus, diversification of organisational authority is based on the transfer of the resources from the different sources. As much as universities in this study are explored as organisations, the major influencer of the university education system is the government. Daviet (2016) argued that education is a public necessity, and therefore it is government responsibility to ensure adequate funding is available to the sector. Ashwin, Carpentier, Case, Marshall, McCowan, McKenna, Naidoo, Schendel, and Walker (2018) outlined that although government support decreases in public universities, it is still the central tool of financing universities. As a “public good”, university control and authority are still highly influenced by the government's authority over university management. Revenue sourcing and diversification pose a threat to the decreasing government subsidy. If private stakeholders invest resources in universities above the

government subsidies, this may influence control leading to the privatisation of control.

According to Carr (2019), diversification of resources is the key to reducing complete dependencies. Hence, an organisation's survival is measured by the adequacy of resources, leading to an independency of organisations that transfer resources. Diversification of sources reduces dependency on only one source by vesting the interests of stakeholders to multiple sources (Delke 2015). This ultimately reduces the control of the major stakeholder on the organisation. As public universities are public entities, it is difficult to manipulate control over them, but if government subsidies to these institutions keeps dropping, the threat of private sector intervention to manipulate control is foreseeable in these entities.

There is a distinct relationship in financing public services under which the regime of quasi market exists. A quasi market supports the financing of public services by multiple players in the economy in both the public and private sectors, although the responsibility of this funding regime is that of central government (Lewis 2017). In respect of commonalities, the RDT and the quasi market are observed as related approaches to financing public services in the context of this research. Both these approaches highlight the influence and intervention of different economic players in the business of others.

RDT contends that survival of the organisation depends on another organisation or person. This implies that the university's financial sustainability depends on the availability of financial resources, and for which these resources give right and privilege to the providers. Hence students and their families are an integral part of financial sustainability, as they share a portion of university financial resources for financial sustainability, that is, "tuition fee". As a result, they enjoy a right over the university to provide them with quality education. On the reverse side on governance of these universities, government also contributes a share to these financial resources through government subsidies while the private sector is also allowed to contribute to the university financial resources through third-stream income.

This highlights the various parties' interests in financing public universities, showing the dependency of these organisation for resources transfer. In the context of this study, financial resources as the revenue sources are the factor of organisational dependencies. For the university's financial sustainability, resources are acquired from different sources, tuition fees, government grants, and third-stream income. For efficient and substantive operations, universities depend on other organisations. Hence, this points to RDT as a theory that can explain the context of this research concerning sourcing of revenue for universities' financial sustainability.

A second relevant theory is that of neoliberalism theory. This theory is discussed next.

2.2.2 Neoliberalism theory

Turner (2008) defined neoliberalism in four generic principles. The first principle emphasises the market order as a mechanism for the efficient allocation of resources and safeguard of individual freedom. The second principle is the commitment to the rule of law (legislative justice). The third principle is characterised by laissez-faire, affording the state a role to preserve constitutional rules to safeguard the market order while providing public goods; this principle advocates minimal government interventions while embodying political authorities. The last principle enforces the right to private property, establishing the value of individual against collective.

Neoliberalism theory contends that for better efficiency of services, the servicing system must be inclusive of the provider, stakeholders and beneficiaries in its decision making (Pennington, Mokose, Smith and Kawanu 2017). This is believed to render efficient service delivery and unbiased decisions. The concept of neoliberalism persists in public universities characterised by diverse students' political mobility (Van Der Walt 2017). The South African political life characterised by youth influential since 1976, the current perpetuated ideology of free education as stipulated in 2015, and the universities' students' intense demands across South Africa are indications of neoliberalism ideology (Pennington *et al*. 2017). Pennington *et al*. (2017:4) further state that the extent

of the finance structure of the university, modified by students' debts, increasing tuition fees and dwindling state funding supports the tracing of neoliberalism in the South African universities. The perception of the right to access public services such as healthcare, education, and welfare is commonly considered private rather than public goods because of the conflicts associated with access (Sebake 2017). The neoliberalisation of South African universities has contributed to the deprivation of the poor, students and workers, emphasised by the unrest that the university sector experiences by students and workers (Pennington *et al*. 2017). A study conducted in Zimbabwe highlighted how neoliberalism ideology affects the model of university funding and the effects of global concern to declining state support (Chinyoka and Mutambara 2020).

To justify the gaps in literature, where context refers to social landscape and citizenry concerns, the neoliberalism theory outlines these factors (such as fees-must-fall, affordability of higher education and students debts, among others). The influence of inconsistent state subsidies and tuition fees collection is also justified by neoliberalism theory because of their context being associated with a social dilemma. Whereby the RDT, supports relationship among the fators underpinning revenue sources and their relationship to financial sustainability.

As much as RDT is the central theory underpinning this research, neoliberalism is the supporting theory to justify the highlighted gap in literature. Many internal and external forces of the university are motivated by political mobility, which has confronted South Africa in the recent decade. The fight for free education has distorted universities' financial leverage, and vast control measures were initiated to control these forces. This highlights the relationship of neoliberalism associated with the higher education system. While such gaps cannot be justified by RDT, neoliberalism theory is the associated theory in explaining the relationship of such theory to the context of this research.

Having discussed theories underpinning this research, the discussion is next extended to the research area in which the theories apply: the South African higher education sector. Hence, the following section discusses the interaction of the theories within South African higher education sector.

2.3 Context of tertiary education in South Africa

USAf (2016a); Pouris and Inglesi-Lotz (2014) outlined the role of universities as pivotal in building knowledge in the nation and the elevation in the nation's social status, economic status, and well-being. Pouris and Inglesi-Lotz (2014) described the mission of tertiary education as being four cornerstones. These are the formation of human capital, elevating knowledge through research, dissemination and maintenance of knowledge. Tertiary education is a key determinant for economic growth, and human capital is essential for applying knowledge and practice for development. Hence the role of tertiary education in society cannot be underrated (Fisher and Scott 2011). The value of tertiary education is high, with a wide range of benefits such as knowledge and the enhancement of health and wellbeing (USAf 2014). Tertiary education is an essential tool for economic growth, technology advancement and enhancement of human capital.

Universities have been instrumental as a domain of information for decades (Pouris and Inglesi-Lotz 2014). Higher education has been a fundamental tool to redress the past imbalances by societal development, opening the opportunity to participate in higher education to everyone eligible (DHET 2018). Thus, universities have been characterised as crucial instruments for social mobility and overall economic development (Fisher and Scott 2011). Presently the significance of higher education sector is recognised worldwide. Pouris and Inglesi-Lotz (2014) argue that if higher education benefits overall economic development, it should be compensated for by the government. In most countries, governments contribute enormous financial support to public universities (Basri *et al.* 2019). In South Africa, the Higher Education Act 101 of 1997 provides for the finance structure of public universities' funding, and government support to these institutions has been the leading source of revenue.

Higher education is pivotal in developing, maintaining, and integrating world economies (Naidoo and Ranchod 2018). The international recession and financial crisis of 2008 required countries to focus on Research and Development (R&D) for economic recovery (Wangenge-Ouma and Carpentier 2018). The current Covid-19 pandemic has also emphasised the need for scholars and

universities to address the effects of the pandemic, which includes social stress, health and wellbeing and the economic crisis (Ajam 2020). Climate change has also called for interventions of higher education expertise. As a result, there is a focus on the development of R&D in universities and sponsorship for such projects. Universities' current focus on research is at the expense of undergraduate teaching as universities encourage staff to undertake research and students to undertake post-graduate studies. Ashwin *et al*. (2018) outlined that South Africa is a nation with diverse inequalities resulting from the diverse social landscape, including higher education, whilst the coloniality of the past still influences the present. As universities advocate inclusivity, the grade 12 National Senior Certificate (NSC) pass rate does not assist in the growth of the envisaged national enrolment targets as outlined in the National Development Plan (NDP) 2030 (Tjønneland 2017). Since the ending of apartheid, South Africa has attempted to address the historical disadvantages. Although enrolment at universities has increased, there is still a significant unemployment rate (USAf 2016a).

The preceding section has outlined the importance of higher education to South African economic development. The next section provides an overview of the South African universities' status quo.

According to DHET (2020:14), South African universities comprise 26 public universities structured into three categories (12 traditional universities, 8 comprehensive universities and 6 universities of technology) with 1 085 568 enrolments. This is an increase from 495 356 enrolments in 1994. An increase in the number of African students being granted access to universities has contributed to this greater enrolment. The NDP 2030, in order to address inequalities and poverty elevation, envisages university enrolment to be at least 1.6 million in 2030 (Tjønneland 2017).

The South African nationwide student protests "fees-must-fall", highlighted universities' access challenges and other internal challenges (Ashwin *et al*. 2018). These access challenges, among others, include historical disadvantages, community income landscape and inclusions (Ashwin *et al*.

2018). Internal challenges include increasing student debt and, therefore, exclusion from registration for academic programmes.

As much as the government implemented a series of policies in driving economic growth, the relationship of such steady growth with inequalities, poverty and unemployment is complex (Pedrosa and Kloot 2018). The interaction of government and higher education institutions and the vast powers of the government have resulted in the government making significant decisions concerning universities with no prior liaison with the universities (Kharusi and Murthy 2017).

Government subsidies to universities have not kept pace with the growing enrolments in South Africa (USAf 2016b). Thus, to compensate for the rapidly increasing cost of higher education, students have been burdened with rapid fee increments (Wangenge-Ouma and Carpentier 2018). As a result, students who do not complete their qualifications are left with substantial debts, and little return for their participation in higher education and these are most likely to be students from poor backgrounds (Ashwin *et al*. 2018).

The above section has explained the status quo of South African universities and their contribution to the overall societal development. In order to align this literature to this study's aim, it is important to understand the revenue recognition and measurement structure of the public universities in South Africa. Hence, the next section discusses the public universities' revenue structure that is also applied in DUT.

2.4 South African public universities' revenue structure

In order to better categorise the income generated by the universities as revenue, it important that the definition of such income that may form part of the university revenue is outlined. Hence this section provides a definition of revenue, its measurement, and the various categories of public universities' revenues, such as those outlined by the DHET. This section also provides the financing model presently adopted by public universities and the current revenue structure in the financing of universities.

2.4.1 Revenue recognition

The following recognition of revenue is found in IFRS 15 (International Accounting Standards Board (IASB) 2014).

“IFRS 15 recognizes revenue over time as well as allocation of transaction prices based the various performance obligations. This reflects the consideration to which an entity expects to be entitled in exchange for transferring goods or service to a customer”. This standard also requires entities to exercise judgment, considering all the relevant facts and circumstances when applying the five-step model to contracts with their customers. IFRS 15 specifies the accounting for the incremental costs of gaining a contract and the costs directly related to fulfilling a contract (IASB 2014).

For a university, revenue consists of tuition fee income, residence fees, research funding and other miscellaneous income from the sales of any goods and services (DUT 2019). (Grant income is recognised in terms of the standard on government grants.)

To recognise income generation activities as revenue to the university, the criteria for revenue as set out by DUT is discussed next.

2.4.2 Revenue measurement

In the 2018 annual financial statements of DUT, the following description of revenue measurement is found.

“Revenue is measured based on the consideration specified in a contract with a consumer and revenue is recognised when the transfer of control over a product or service takes place” (DUT 2018: 98).

DUT (2018: 98-99) defines the activities providing revenue to the university in the main broad aspects of state appropriations (subsidies and grants), designated income from contracts, grants and donations, tuition and residence fees, interest and dividend income and income from services rendered.

2.4.3 DHET categories

The South African Department of Higher Education (1997) Chapter 5, Section 40 provides for the financing of higher education institutions established in the Republic to be funded in the structure shown in Figure 2.1.

Figure 2.1: DHET funding category

40.	The funds of a public higher education institution consist of -
(a)	funds allocated by the Minister in terms of section 39;
(b)	any donations or contributions received by the institution;
(c)	money raised by the institution;
(d)	money raised by means of loans;
(d)	[Para. (d) substituted by a. 4 of Act 54/2000]
(e)	income derived from investments;
(f)	money received for services rendered to any other institution or person;
	money payable by students for higher education programmed provided by the institution; but the council may disciminate in a fair manner between students who are not citizens or permenant residents of the Republic and students who are citizens or permanent residents of the republic when amount paayable is determined; [Para. (g) substituted by a. 5 of Act 55/99]
(h)	money received from students or employees of the institution for accommodation or other services provided by the institution; and
(i)	other receipts from whatever source.

Source: Higher Education Act 101 (1997: 30)

To substantiate the overall definition of revenue, category and the definition criteria and to set the principle for guidelines in universities, DHET prescribes the funding framework that categories the finance structure of university. In this section of the Act, even prospective sources of finance for universities is prescribed.

2.4.4 DHET funding model for public universities

The current state subsidy funding model for universities is in form of block grants and earmarked grants. The block grants comprise approximately 77% of the total state budget to universities and excludes gap grants and NSFAS. The block grants are council-controlled funds and the discretion for them lies with the council and management of the university. These funds are intended for operational costs, learning and research activities (DHET 2020: 3). The block grant funding means that the state funds universities through success factors including teaching inputs, institutional factors, teaching outputs and research outputs. Whilst the block grants are controlled and can be used at the discretion of the council and university management, the council does not control earmarked grants. Earmarked grants are grants provided for a specific purpose used to ensure achievements of targets and national priorities and often require complex reporting (DHET 2020: 3).

According to DHET (2020: 3), in 2016/17 a gap grant funding model for the missing middle students was introduced and thereafter abolished in 2019. Universities were then burdened with phasing out of this funding model and bearing any surpluses and deficits. From 2019, all first-time entering students (FTENs) into universities had to pay actual fees, and discounts were no longer available.

DHET (2020: 2) also stated that universities must practice efficient measures that will ensure that the available funding is utilised efficiently and effectively. This could be achieved through overheads' reduction, collaboration among universities to maximise savings, improved debt collection, and attracting additional income through third stream income funding (including seeking more donors).

2.4.5 Present university categories of income

Presently, universities' categories of income consist of first-stream income, second-stream income and third-stream income. These income streams are discussed next, ending with a section on overall sources of revenue.

2.4.5.1 First-stream income

This income (revenue) stream is mostly referred to as state grants. The South African Constitution (1996), section 29, defines education as a right to everyone for which responsibility is then vested in the state through reasonable means to ensure its availability and accessibility. In the Constitution and the definitions of basic and further education, the government is the primary custodian of financing educational operations to ensure inclusivity and accessibility by everyone. In the context of a public good, the state is deemed to finance higher education. In most countries, government plays a central role in financing public universities. This source of revenue is pivotal for public universities to continue providing education as a public good (Ashwin *et al*. 2018). Universities are still highly reliant on this income source.

2.4.5.2 Second-stream income

Beneficiaries of university education contribute a portion to university financing, which is known as “tuition fees”. This money is charged about the course of study and other university levies on students. Tuition fee income is a major part of university financing as it contributes +/- 40% of total university finance or revenue (Statistics South Africa (STATS SA) 2017). As the cost of education is increasing year after year and universities are not receiving adequate funds from other income streams, this revenue stream is being heavily relied upon.

2.4.5.3 Third-stream income

Universities, as organisations rendering a service to the public, are also able to generate additional revenue to support their activities and operations, as the first and second streams of income may be uncertain (Wangenge-Ouma and Carpentier 2018). This income source comprises income generated by the university in its business ventures such as research work, donors, service rendering, sales, and university investments.

South African universities have adopted the usage of third-stream income. In 2015/6 third-stream income amounted to 17% of total revenue (STATS SA 2017). Third-stream income has the possibility of bringing in high amounts of revenue,

however, the challenges of staff training, knowledge and skills are factors that hinder the sourcing of this revenue. University staff and academic departments have recently become aware of this revenue source for sustainability (Swartz, Ivancheva, Czerniewicz and Morris 2018). According to Delali (2015), revenue could either come from internal strategies or external strategies. Internally Generated Funds (IGF) are sources of income categories by the institution from its strategies and over which it has complete control. Externally Generated Funds (EGF) are income sources from potential sponsors and government related to grants and pledges over which the institution has no control.

2.4.5.4 Overall sources of revenue

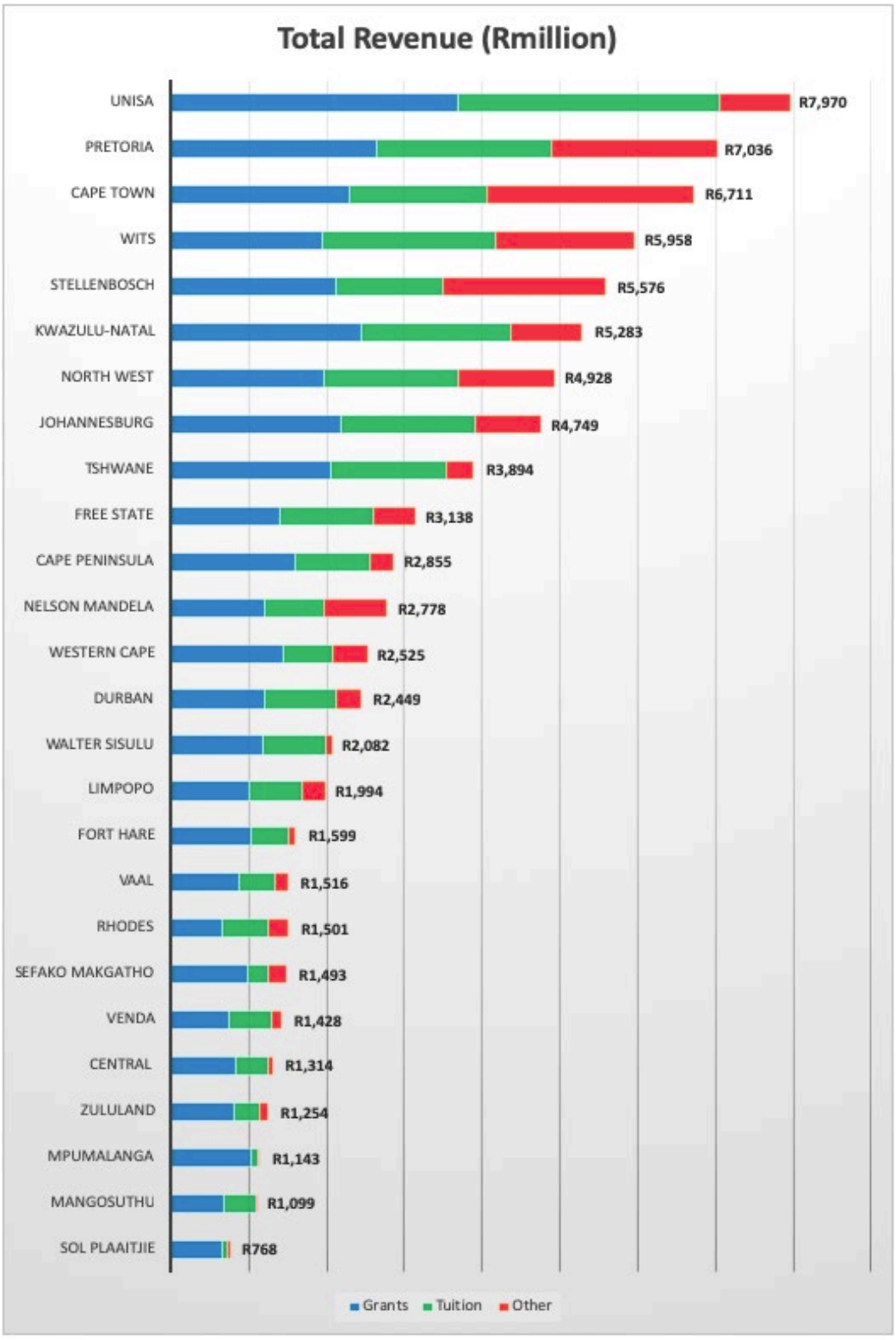
South African universities generate income from multiple sources, varying proportionally to the quantity and revenue they generate (Wangenge-Ouma and Carpentier 2018). While all universities are encouraged to diversify their sources of revenue, others are still highly reliant on state subsidies and a lesser extent on tuition and third-stream income (BusinessTech 2017). As much as these South African public universities use similar revenue structures for their revenue sourcing, there are still variations in the revenue they generate, though some universities rank higher than others with the value of their revenue much higher. The commonly scrutinised revenue source is state subsidy as a measure of equity, but third-stream income growth is not satisfactory to the South African universities (STATS SA 2017).

Universities in better economically functioning societies (such as those situated in the major cities of the country, that is, Cape Town, Johannesburg, and Durban) tend to do much better than those situated in less economically advantaged areas Mpumalanga and Limpopo (BusinessTech 2019). Universities have voiced their concerns to fee-free higher education as they say they are likely to go bankrupt if this is initiated (BusinessTech 2019). While the government is working on a regulatory tuition fee as these fees have hiked to where only rich can afford them, this is still in progress (Fengu 2019). This follows recommendation made by the Commission of Enquiry into Higher Education on the feasibility of fee-free higher education, which proposed a “cost-sharing model” as the fair revenue sourcing model (Fengu 2019). While the state subsidy through NSFAS has

sustained the revenue of higher education institutions (Wangenge-Ouma and Carpentier 2018), third-stream income is still the future for the universities' financial sustainability as its capacity is infinite depending on the strategies used to embrace this revenue stream.

As state funding is dwindling and the funding model does not favour low-output institutions because the funding varies according to institutional success factors, DUT does not generate third-stream income as Figure 2.2 indicates. Out of the 26 public universities in South Africa, DUT is ranked 14th with little revenue from tuition and third-stream income. This may indicate that serious measures need to be put in place for DUT to attract more revenue from other sources. What is evident is that the leading institutions have high numbers of student enrolments and /or research output (STATS SA 2017).

Figure 2.2: Public universities' revenue rankings



Source: BusinessTech (2019)

2.4.6 Challenges with revenue sources

Higher education institutions are still highly reliant on state support and tuition income (Wangenge-Ouma and Carpentier 2018). According to STATS SA (2017), over 34% of higher education institutions revenue comes from tuition fees, and 43% comes from state grants, 6% comprised of donations and 17% was income generated from other sources (STATS SA 2017). South African universities in the last decade have been strongly reliant on tuition fees which have been greatly impacted by the neoliberalisation surrounding higher education because of unaffordability and inclusivity (Crowther, Strydom and Dzansi 2018). The state restricted tuition fee increments by universities in 2016, resulting in a major financial crisis in the higher education sector as a loss of about R 16.7 billion resulting from this decision was to be subsidised by the state (STATS SA 2017). The state's tuition burden is huge; hence, in 2018, the government announced that government through NSFAS will introduce fee-free education. This situation is not unique to South Africa. Universities worldwide are concerned with the rapid decline in state support to institutions of higher learning. Decreasing state support increases the financial vulnerability of universities (Gebreyes 2015).

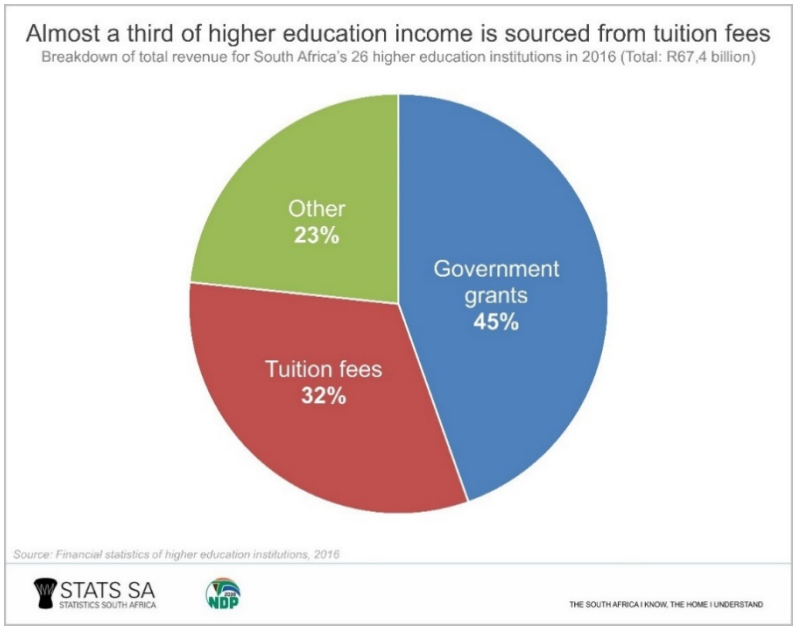
While government interventions in addressing students' demands have left universities with a financial burden and the threat of a financial crisis, universities face challenges to raise revenue from other sources of income. Oketch (2016) outlined the continuous decline of state support subsidies to public universities as a global challenge, hence competition towards third-stream income is quite common. While this may seem like a reliable source that can ensure financial sustainability, it leads to a greater dependency of universities on the private sector. There are also limitations to third-stream income generation as this would encourage competition between limited clients or supporters, thus creating adverse competition for public universities. As much as South African universities are cautious of this revenue source, there is a steady growth in revenue generated from this income stream (Wangenge-Ouma and Carpentier 2018).

Despite also the emphasis on debt collection, the reality of the imbalances of the past and poverty remain; hence institutions end their financial years with huge

amounts of uncollected debts (Pells 2017). This debate on revenue streams has concluded that diversifying revenue sources is the ultimate solution, as no single source is perceived as entirely reliable (Oketch 2016).

STATS SA (2017) highlighted overall income sources and percentages for the South African universities. This is shown in Figure 2.3.

Figure 2.3: Income stream statistics



Source: STATS SA (2017)

Having discussed the revenue categories and proportionate literature, supported by definitions of terms, the next section discusses financial sustainability as a factor underpinned by the availability of revenue.

2.5 Financial sustainability of public universities

Financial sustainability is measured by the availability of resources and containment of rapidly rising costs of offering academic activities and research and guaranteeing surpluses for future investments in academic activities and research (Afriyie 2015). Duffin (2020) discussed four sustainability measures: access to capital, profitability, reporting, and planning. These involve analysing current and future demands and measures of anticipating the targeted growth, analysing the success or failure of a business through profit measurement,

reporting and planning. These factors can be related to universities; that is, capital as the pool of revenue sources to public universities, profitability as the ability to cut costs and maintain the surplus position of the university, reporting as the fulfilment of dependency and keeping society informed, and lastly planning as the proper allocation of resources in a cost-efficient manner to maintain the surplus position. Benjamin (2017), on the other hand, specified revenue expenditure, market conditions and legislative changes as factors affecting planning for financial sustainability.

Afriyie (2015) further outlines that financial sustainability is not only the issue of accounting for adequate or proper allocation of resources; the administrators and management are drivers of the maintenance of the financial sustainability of an organisation in the long-run (Bernard and Van der Merwe 2016). Furthermore, financial sustainability may be defined differently depending on organisational structure and culture (Peyper 2016).

Finance issues including student support characterise the South African higher education system; universities' operations staff maintenance and market salary ranges (Pedrosa and Kloot 2018). The cost of offering higher education is continuously increasing while supporting technologies are dynamically changing (Kharusi and Murthy 2017). Among other challenges for the university, the capacity of lecture halls and residences are not increasing for the envisaged growth in enrolment. This is why among investments currently considered at the heart of universities in South Africa are university property investments through extending university infrastructure (Kharusi and Murthy 2017). Furthermore, the largest component of a university's operational costs is the employees (staff) cost (STATS SA 2017). These are the challenges confronting South African universities' financial sustainability. While the universities are the cornerstone for the country's development, their challenges cannot be underrated. Finding solutions to the issue of financial sustainability is paramount to ensure that universities continue to offer skills and quality education to its citizenry.

The state plays a crucial role in financing the central operational costs of public universities. According to USAf (2016c), the state subsidy to these institutions has been steadily declining, whereas the cost of education has been increasing.

This has added pressure on the universities to find ways of sustaining themselves by using alternative sources of revenues.

Studies have highlighted that South African universities are confronted with financial sustainability and have practised different approaches to address the financial sustainability issues (Wangenge-Ouma and Carpentier 2018; Cloete, Sheppard and Schalkwyk 2016; Lourens 2016). Universities are still burdened with technological advancement and operations challenge, which have accelerated the rapidly increasing cost of higher education in South Africa (Bansi 2019). Some of the costs are unavoidable because of the need to maintain quality. Therefore, cost-saving becomes difficult for a university, which requires quality staff, quality equipment, quality facilities, and quality management, which are essential cost imperatives.

2.5.1 Challenges of financial sustainability in public universities

Both the state and higher education institutions must work together to close the financial gap of these institutions to bolster their financial status. The state's current funding model has introduced ways for the university to attract funds such as by increasing research output and increasing the throughput rate. However, universities of technologies do not have significant levels of research output and student throughput is low (Lourens 2016). The universities are also tied up in raising third-stream income, whilst the tuition fee is still uncertain considering the government interventions to assist redress and help the students as mobilised by the 2015/16 student movement for a fee-free education. This highlights that public universities are in a financial crisis as their revenues are inconsistent and uneven. This requires effort from both the state and the public universities to ensure that the predicaments do not jeopardise the value and quality of education.

The underlying challenges of the revenue generation methods used by universities are both internal and external. These challenges are discussed next.

2.5.1.1 Internal challenges

Malgwi (2014); Ofoegbu and Alonge (2016) define IGFs as income generated from strategies of the universities, that is, those empowered by academic departments, alumnae and other university processes. Averse human behaviour is perceived to be the challenge towards the generation of this income through administrative fear of managing diverse funds. As a result, preference is afforded to traditional funding only (Malgwi 2014). A high level of corruption and greed are also rife in these income streams (Ofoegbu and Alonge 2016). Control and interventions of the state into IGFs like fee increments have introduced these institutions' financial planning challenges. These challenges compromise the financial standing and leverage of higher education institutions.

2.5.1.2 External challenges

External revenues to universities consist of income from the state subsidies, donors and investors. The continuous decline in state support is challenging public universities to source alternative funding schemes. In December 2017, the former president, Mr Jacob Zuma, announced that in 2018 free higher education would be provided to all qualifying new first-year students (Muller 2018). The fees-must-fall campaign opened a controversial topic for universities and government, adding pressure on them to seek extra funds to ensure education is accessible to those who qualify (Muller 2018). The reality is that education is expensive, unlike other public services. Common questions asked are: Who will pay for free education? Who will free education benefit? Will it be financially viable to endorse free education? Since state support is the central revenue for higher education institutions, the model of funding presently being used treats institutions unequally and leads to more vulnerability of institutions especially those with minimal research output. Therefore, universities' financial sustainability is mostly reliant on multiple stakeholders, including the students, state, and other private stakeholders.

2.6 Review of empirical literature

There are differing perspectives on the solutions to financing public universities globally, while the general belief is that the state as central government must be

relied on for any discrepancies or shortages in the revenue pool for public universities. This section of literature illustrates the current literature in the context of public universities in order to provide a global view.

In the context of deriving intensive empirical evidence in this research area, an in-depth review of recent literature is imperative to show and discuss the findings of prior research and highlight possible gaps that this research seeks to address. Table 2.1 below highlights the empirical evidence from global and African studies.

Table 2.1: Empirical studies				
Citation	**Country**	**Aim or Objective**	**Methodology**	**Empirical findings**
Global context				
Almagtome, Shaker, Ai-Fatlawi and Bekheet (2019)	Iraq	The study explored the relationship between financial sustainability and accountability under the university autonomy and empirically evaluated the extent of financial sustainability of public HEI's in Iraq.	The study adopted an exploratory approach using semi-structured interviews and content analysis procedures.	Their findings indicated that financial sustainability and accountability are interdependent, under which management play significant role to ensure regulatory governance of financial resources. Their findings further indicated that their sampled university had a poor financial sustainability forecast and as a result could not continue as financially independent without government support. The study further highlighted that the financial deficit in the financial position was the result of unregulated financial and administrative authorities. Thus, public HEI's were encouraged to evaluate their own institution's financial sustainability.
Saudi (2019)	Malaysia	The study addressed the need for universities in Malaysia to seek potential alternative income generation strategies.	The study was a case study which adopted a mixed method approach with qualitative data derived from survey-based discussions with	The study found that student accommodation particularly for international students aided the enhancement of revenue to the university and provided financial figures on how this will be viable. It concluded that a proactive approach to alternative income sourcing is the key to

			university management, university housing centre management and the finance officer.	reducing the dependency of universities on government support which reduces year after year.
Marginson (2018)	United Kingdom	This study scrutinised global trends in higher education financing, looking at United Kingdom perceptions.	This was an empirical study exploring data that is already published and comparative figures from various sources.	The study highlighted that the United Kingdom has moved from a full public funding to a privately funded tuition market. Their system of HEIs is still subjected to government regulation and policy control. Students are assisted through tuition loans to bridge income gaps, though there is still variation between fulltime and parttime students. Few interventions are made to enhance university access through tuition subsidies. Competition is regulated in research contracts and international students' enrolments.
Panigrahi (2019)	India	The study explored financing of universities in India.	This study was based on a review of empirical evidence on the financing of Indian universities.	Universities in India are still highly reliant on government funding. As universities increase, government is not able to adequately cover the financing of universities hence universities are asked to be self-sufficient in their funding models. Government funding contributes the most funding to universities contributing a total of ¾ to the overall university revenue. The universities are also encouraged to increase their funding sourcing for their efficient operation. However, universities in India still

				struggle to access alternative revenue sources in their revenue generation strategies.
African context				
Ekpoh and Okpa (2017)	Nigeria	The study examined the diversification of funding sources and the accompanying challenges.	Their sample size was 480 academic staff from four federal universities in South Nigeria. They used a structured questionnaire instrument to collect data using Likert-scale type questions.	Their findings revealed diversified sources of income such as consultancy services, commercial ventures and part-time degree offerings are the key to ensuring financial sustainability. They found key challenges to be the mismanagement of funds, poor staff attitudes, increased student enrolment affecting the staff-student ratio and lack of entrepreneurial culture. Their recommendations were that strict regulations must be imposed on financial resource management.
Yemer (2017)	Ethiopia	The study reviewed the relationship between the internal control system, revenue generation strategies and internal revenue of public universities in Ethiopia.	The study was a review of empirical studies and theories in the context of revenue diversification strategies, internal control systems and internal revenue of public institutions.	The study reported that institutions with a proper internal control system have capacity for diversifying their revenue generation strategies which enable them to generate sufficient revenue. While those who fail to impose internal control, their systems reflect an improper handling of resources, undertake less revenue activities and focus mostly on the traditional funding activity. This study concluded that the internal control measuring system is the key to tracking institutional success and proper resource management, consequently ensuring that adequate revenue is generated.

Chumba, Muturi and Oluoch (2019)	Kenya	The study assessed the effect of financial investment strategies of universities in Kenya to establish and evaluate the effect of investment and consultancy strategies on the financial sustainability of universities in Kenya.	The study used a descriptive and cross-sectional correlational survey design with a population of 71 universities in Kenya targeting DVCs and finance officers.	The descriptive analysis found that the investment strategies of universities were highest in real estate. Consultancy strategies had the highest mean, with the assumption that universities had specialised experts in different fields. The underlying finding was that universities need to embrace various resource strategies to boost their financial sustainability.
Chinyoka and Mutambara (2020)	Zimbabwe	The study examined challenges to revenue generation among state universities in Zimbabwe.	A case study approach was adopted and applied to 12 purposively sampled participants. An inductive approach was used to analyse the responses.	In this study, factors affecting revenue sourcing and its contribution were criticised. These factors included macroeconomic and politics. Regulation by law was among the solutions suggested for controlling these factors. Challenges were infrastructural development and university facilities not adapting to growth in students' enrolments. A barrier to all these challenges encompassing university education was found to be leadership as it is an important parameter and cornerstone for successful and efficient acquisition of resources and management.
South African context				
Bansi (2019)	South Africa	This study examined the factors that contribute to the current low rate of	The data for this study was collected from two sources and a semi structured	The study diagnosed four primary demanding situations to commercialisation in South African universities: firstly, commercialisation did not appear as an exclusive priority

		innovation commercialisation at South African universities, with the aim of growing it.	interview. Questionnaires were distributed to intellectual property managers in 23 public universities and interviews with six innovators from one in the 23 that had strongest commercialisation record.	by the senior university management; secondly, universities had a limited entrepreneurial culture which inter alia meant that research projects were not undertaken with commercialisation in mind and consequently lacked market focus; thirdly, funding university commercialisation was steady, and fourthly, university interaction with industry was weak. It concluded that South African universities are lacking in using commercialisation as an instrumental tool to enhance their revenue generated from third stream income. However, it would not be fair comparison to use universities from advanced economies and those with great experience in commercialisation as this is a new strategy in South African universities.
Crowther, Strydom and Dzansi (2018)	South Africa	The study aimed to compare South African universities of technology to internationally acclaimed hotel schools and identify best financial management practises.	The study employed a qualitative research approach with interviews with HoDs and senior staff with knowledge of financial management, using a purposive sampling approach.	The study found that hotel schools have capacity to generate much more revenue in measuring their financial sustainability and to contribute to overall university financial sustainability. Factors like students drop-out rate and student debt are among the hindrances to financial sustainability of these university segments. The study recommended that an approach to promote marketing strategies, increasing offering like online classes and short courses could be of great benefit to the financial sustainability of these segments and to overall university

				financial sustainability. Segments like a hotel school were also interpreted as an essential pillar in enhancing university income from third-stream income strategies.
Bitzer and De Jager (2018)	South Africa	The study investigated commerce students' perceptions in a South African university about the feasibility of free education.	The study used a questionnaire research instrument, with a Likert-scale design. An open-ended question was used to ascertain the students' definition of free education.	Their results indicated that most of the respondents realised that free education was not feasible for south Africa at that time. The perception of free education feasibility was disregarded in the view of these students on the basis that free education must be for all and not only for those selected on the basis of equity as illustrated in the DHET Act. Their findings further illustrated that free education is not concerned only with tuition but also living expenses. Their findings indicated that free education can be subsidised by the taxpayers.
Swartz, Ivancheva, Czerniewicz and Morris (2019)	South Africa	The study examined the core business of South African universities which underpinned that successful operation of these institutions depends on sufficient resource allocation. This meant that universities need to source more revenue to bridge their finance needs.	The study was a qualitative study mainly using structured interviews to derive their findings.	The findings indicated reputation and ranking were among the main factors for maintaining standard of teaching output and research capacity to enhance their revenue to carry out their core business function. It further indicated that including external partnerships was a means to generate additional revenue to the university. It was commonly perceived that education is seen as a way out of poverty, as education is an historical injustice. However, third-stream income and advocating partnerships with external society could increase revenue to the universities and ensure the adequacy of resources

				to address the social injustice. It was further indicated from the interviews that universities have used property holdings as a mode for generating additional revenue. While university education requires resources, challenges such as increasing tuition fees and state support are still steadily growing affected by neoliberalism. The challenge of financing higher education in South Africa is still problematic and universities in South Africa still operate in the context of addressing social injustices and inequalities.

2.7 Synthesis of the empirical literature

The findings from the empirical research studies shown in Table 2.1 indicate differing perceptions on the correct approach to financing a university. Financial sustainability is better guaranteed by the availability of resources and the maximisation of savings. However, it is not prudent to rely on just one of the sources of financing. These different sources have different challenges. State grants are uneven; tuition fees are uncertain; however, third-stream income is steadily growing. Therefore, diversification of these sources is a financially viable decision to financing a public university as these sources could complement each other in times of uncertainty.

Underpinned by the empirical studies are the models of financing and different practices adopted by different countries. In the African context, the findings of Yemer (2017); Ekpoh and Okpa (2017); Almagtome, *et al*. (2019); Chinyoka and Mutambara (2020) were similar in that the university management and adherence to regulations hinder sufficient revenue generation. These studies also highlighted that these factors are a threat to universities' financial sustainability and existence. Similar recommendations were made for strict adherence to regulations and management accountability. Chinyoka and Mutambara (2020) also highlighted funding challenges as macroeconomic factors, such as politics and regulation by law.

The South African studies of Swartz *et al*. (2018); Crowther *et al.* (2018); Chumba *et al*. (2019); Bansi (2019); Saudi (2019) suggested diversification of revenue as the key solution to universities' financial sustainability. Also, they suggested some strategies to enhance revenue generated from third-stream income. Recommended strategies included commercialisation, students' accommodation and international students' enrolments, offering new courses and short courses. The study based in the United Kingdom reported the university tuition fee is not mediated by the state, however, it is regulated by it (Marginson 2018). This was a unique finding, different from the other findings shown in Table 2.1.

Panigrahi (2019) highlighted that Indian universities are highly reliant on government funding and to a lesser extent in other sources of financing. Similar to Panigrahi (2019) findings, Bitzer and De Jager (2018) reported that South African students believe that South Africa can afford free education financed by government and through taxes.

2.8 Gap analysis

The higher education funding framework does not rigidly prescribe any of the funding streams to university, that is, focus on a single funding model. Under the Higher Education Act 101 of 1997, public universities are expected to attract a diversified funding framework in the manner provided in the Act. The constitution further provides that the Minister must develop the funding policy in consultation with the Council of Higher Education (CHE), and the Minister of Finance. The policy must also provide appropriate measures to redress past inequalities in a fair and transparent basis.

The initiation of free education for the poor in 2018 is not in contravention of the Act. Rather, it provided an appropriate measure to redress inequalities by catering for the poor to enter the system of higher learning. USAf (2016b) outlined the inadequacy of funds or resources to support the rest of South African student population towards free education and emphasised the feasibility in financing the poor group or category of students towards the free education.

Tax increments have been used to finance higher education and combating inequalities as prescribed in the constitution. Vally, Motala, Naidoo, Hlatshwayo, Maharajh and Marawu (2016) argued against the affordability of free education by the South African economy. These researchers were against the increment of fees and the burdening universities' financing structure affecting universities' survival. Rather, they advised universities to seek alternative funding to ensure their financial sustainability (Vally *et al*. 2016). The source of such financing has always been from taxpayers, Vally *et al.* (2016) concluded that the rich, about 10% of the South African population, should be the target for increased tax payments. According to Vally *et al*. (2016), the tax focus on the financing of free education must not perpetuate inequality but redress it fairly.

The state's role in financing public universities as the country's public service is indisputable. The South African population is continuously increasing, creating a need for youth development to elevate communities and the country's economy (Lourens 2016). Education creates employability expectations with universities focusing more recently on entrepreneurship as a graduate attribute (Wangenge-Ouma and Carpentier 2018). The South African initiative of free education must not be seen as a

budgetary concern but rather as an investment opportunity with greater returns of alleviating poverty and promoting economic growth.

Wangenge-Ouma and Carpentier (2018) highlighted the financial crisis for public universities due to the proposed fee increment “freeze” as illustrated in 2016/2017. This highlighted that universities are not adequately funded and are not raising adequate funds from their internal revenue strategies, resulting in the decision to use fee increments to ensure financial sustainability. This shows that universities’ financial sustainability is strongly reliant on the level of state support.

2.9 Reality in context of university financing

The review of related literature has highlighted generalised literature and intrinsic literature that need to be scrutinised to get a practical understanding of the context of their content. The following discussion is separated as stigma and reality; stigma meaning general belief and reality meaning scrutinised stigma. Firstly, stigma is outlined regarding the perception of universities’ financial sustainability and thereafter it is contrasted with reality in the researcher's perception.

2.9.1 Stigma

From the explored literature on theory, concepts, and empirical studies, it was noted that the following factors were common:

- Global concern to a decline in state subsidies.
- University funding according to block grants is an advantage to universities which have been operating for several years and a disadvantage to those recently established.
- Free education is not feasible in the South African economy
- Third stream income has steady growth.

2.9.2 Contesting reality

Tuition fee is presently debatable as central to university financing because of the government’s interventions to regulate this income stream. Students who come from middle class families and poor families are now subjected to zero percent payment of any tuition increment which universities previously had relied upon to meet any

financial crisis. Tuition fees are only payable by those who can afford it (students coming from families with gross income of + R 600 000 per annum).

Block funding by government to universities has introduced diverse inequalities among higher education institutions. The problem with the current model is the stifling of higher education institutions due to being either emerging in the university environment or being categorised by its standards and student population. Though this model is debatable, it has increased the efforts of universities to meet the NDP 2030, which aims for 1.6 million enrolments in universities by 2030 (South African government n.d.). Universities have opened up student enrollment due to this funding model, encouraging postgraduate enrollment, and encouraging university staff to attain postgraduate qualifications.

There is a competition between universities through enrolments and research outputs, among others. The effect of declining state support has encouraged universities to undertake different stimuli to increase their income sources, such as by increasing research output and research projects and advocacy for service rendering and contracts. This has given universities the opportunity of developing new ways of attracting more income sources. Though there is a steady growth in this stream of funding, its growth rate may be hindered as universities are competing for limited clients. Several researchers (Akomolafe and Aremu 2016; Ekpoh and Okpa 2017; Masaiti 2015) agree to that this funding model (third-stream income) is the future for universities, although it increases resource dependencies.

Having discussed reality in the context of university funding, the next section provides information on DUT which is the context of this study.

2.10 Durban University of Technology

The study is conceptualised in the DUT paradigm.

DUT was the result of the merger of Technikon Natal and M. L. Sultan Technikon which took place in 2002 and was then known as Durban Institute of Technology (DIT) (Ngcamu and Teferra 2015). The merger of these institutions increased their cost effectiveness, decreased the duplication of higher education institutions (Daweti 2015; Ngcamu and Teferra 2015), and increased their financial leverage status. The DIT was

renamed the DUT in 2004 (Lourens 2016). Their financial status was not similar as Technikon Natal financial records revealed a deficit, whilst the M. L. Sultan revealed a surplus (PricewaterhouseCoopers 2000). DUT is a leading higher education institution in South Africa, particularly in KZN, and is known for its leadership in technology, high-quality information technology, and productive citizenry (Lourens 2016).

Studies have shown that the most common challenges with the South African higher education sector are low student throughput, decreasing state support, lack of postgraduate policies to facilitate the programmes and inadequate facilities (Pouris and Inglisi-Lotz 2014). The rate of revenue growth from third stream income is steady especially in universities of technology as they had no prior research emerging from merger (Lourens 2016), while they also try to bridge the throughput challenge through new programme designs and by increasing the student enrolment plan.

Financial sustainability could be indicated by the status of the audit opinion on the financial statements as it refers to going concern and forecasts the existence of the organisation in the forthcoming future. There is a relationship between the status of going concern, profitability, and resource availability. The DUT Annual Financial Statements (AFS) of the past five years have revealed that DUT has been reported as financially sustainable by acknowledging the status of going concern, fair presentation, and profitability (DUT 2014; DUT 2015; DUT 2016; DUT 2017; DUT 2018).

In the strategic focus of DUT as reported in the 2014 AFS (DUT 2014) which is towards building a sustainable university, a scrutiny of sources of income and enrolment targets showed that an approximated total income of R 14 million was derived from third-stream income, staff compensation was 69% of recurrent income and the ratio to costs were 54% and 46% direct and indirect respectively. NSFAS funded students comprised 21.5% of the university student population, and 6.9% received scholarships and bursaries.

DUT further identified revenue generation as a risk-bearing area of university operations, with financial risk as collecting student fees, funding from NSFAS, fraud, bribery and corruption, third stream income and significant projects risk. The non-financial risk was identified as the incidents of student unrest, facilities, quality of

student accommodation, research output, quality of student leadership and safety and security (DUT 2014).

Reddy (2014) reported forming the university council body for decision making and enforcement in the universities in South Africa, the University Council Chairs Forum South Africa (UCCF-SA). Reddy (2014) highlighted that the vision of the UCCF-SA was to promote co-operative governance, transformation and unify the higher education system. The underlying characters of democracy in South African universities since 1994 were highlighted as different levels as governance, funding, planning, quality assurance and the growth of the higher education sector, for which the common issue about the achievement of these democracy promoting factors is financial viability of the higher education sector in South Africa. The idea is to incorporate the NDP 2030 as a measure of success and achievement of goals planned for the overall country development (Reddy 2014). This highlights that the funding issue is the common enemy of most universities in South Africa.

The DUT Council Chair's report highlighted the concern of financial sustainability in the long-run and outlined the need for continuous improvement of staff qualifications, postgraduate students, and research output. A common concern among universities is still the student drop-out rate especially in their first year of study (DUT 2014).

The DUT Chief Finance Officer's (CFO) report in the AFS 2014 also outlined the significance of financial sustainability as a pillar of university financing and budgeting, against the university funding prescribed by the Minister of higher education (DUT 2014).

In 2014, DUT was highly reliant on state funding and university tuition fees as the main sources of revenue to the university, which comprised 84.9%. DUT stated the need to develop new strategies of extending university income streams. DUT had one department as a major source of third-stream income in 2014: the Business Studies Unit (DUT 2014).

The state subsidy is the major factor considered by DUT to be the key determinant of financial sustainability. Financial sustainability is among the parameters of the DUT strategic plan for 2030 and was also in the university's strategic focus in the succeeding term of 2015-2019. To ensure financial sustainability in DUT, focus areas

included the student enrollment growth, increasing third-stream income and increasing research output, reduction of overheads, debt collection improvements, and the improvement of donor funding. Adequacy of resources is still the main measure of financial sustainability in the institution; hence several measures are in place to develop a financially sustainable university through increased focus on the university's internal revenue rather than on state funding (Ofoegbu and Alonge 2016; Yemer 2017).

The university planned to focus mainly on the development and enhancement of revenue derived from third stream income. In its 2015 AFS, DUT highlighted that the Centre would undertake the development towards revenue generated from the third-stream income for Continuous Professional Education (CCPE), which includes offering certificates and short courses (DUT 2015).

For DUT, the effort to build a sustainable university by enhancing third-stream income is at the heart of ensuring its financial sustainability. DUT reported it was under target for the budgeted third-stream income in 2015, while in recent years it has reported that the target was met, and the income derived from this source is increasing from time to time (DUT 2016). In 2017 and 2018, the university income derived from third-stream income increased. This included the amounts generated from short courses and the Educational Development Unit (EDU) programmes (DUT 2018). As much as it is in the strategic focus of DUT to enhance revenue sources, a scrutiny of the revenue sources is needed to evaluate the effectiveness of the existing sources of income and to pave strategies of generating more revenue from existing and other income sources possible for the university.

Among the issues affecting the financial sustainability and DUT revenue are the student unrest movements, government interventions such as the imposed fee increment restrictions, and the unstable NSFAS payments to the university. The student movement of 2015/2016 affected the university's financial sustainability by putting a strain on the university's financial plan (DUT 2018).

The discussion above has provided the context for this study. The next section outlines the contextual framework developed for this study using literature examined in this chapter.

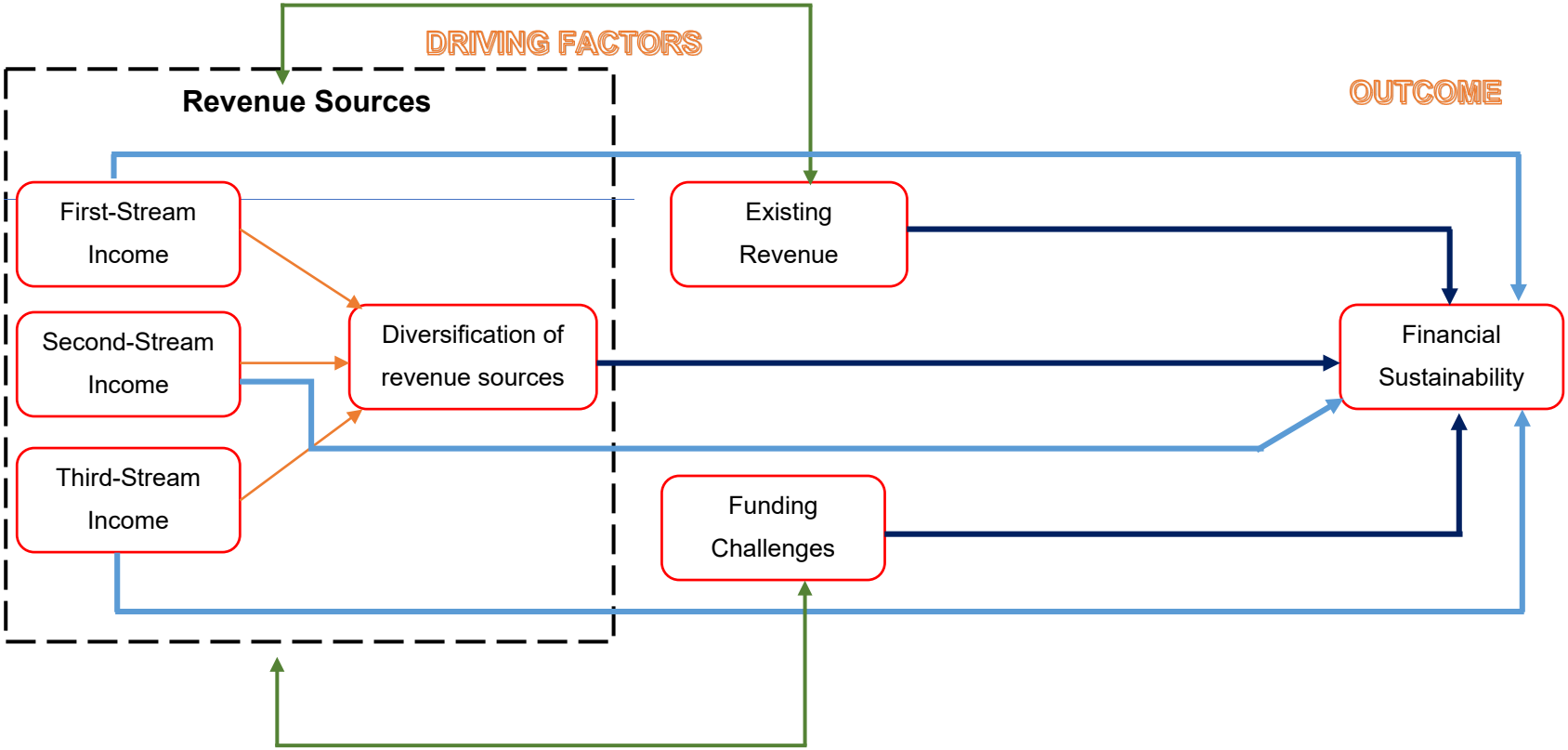
2.11 Conceptual framework

A conceptual framework is a structure in which the natural progression of the phenomenon to be studied can be better explained and aims to give a better description of the relationship between the main concepts of the research (Dickson, Emad and Adu-Agyem 2018). By illustrating the key concepts of the research, this framework assists in constructing the research pathway to the findings underpinned by the concepts (Dickson *et al*. 2018).

The conceptual framework in this study is shown by expressing the research variables and their relationship to each other. Figure 2.4 below illustrates the contribution of each research variable (revenue sources) to the designated area in which the problem statement emerges (financial sustainability public universities).

The following model was developed to represent the conceptual framework.

Figure 2.4: Structured hypothesis research model



Source: Author's design (2021)

This research focuses on exploring available revenue sources in financing a public university, which measures financial sustainability. In the discussion of literature presented in this chapter, it was outlined that the availability of these revenue sources assumes financial sustainability. In the context of the framework presented in Figure 2.4, the availability of all sources of income is the measure of financial sustainability.

This study, therefore, tests the following hypotheses:

H1 = First-stream income has a positive impact on the financial sustainability of DUT.

H2 = Second-stream income has a positive impact on the financial sustainability of DUT.

H3 = Third-stream income has a positive impact on the financial sustainability of DUT.

H4 = Diversification of revenue sources has an impact on the financial sustainability of DUT.

2.12 Summary

The chapter has presented a review of the literature relevant to the research objectives. This included discussion of the related theories. The research variables were reviewed and the empirical findings of relevant studies were discussed. The chapter highlighted the relationship of the research phenomenon and research-related topics and outlined the relationships in a focused manner. The chapter ended with an outline of the conceptual framework.

The next chapter focuses on the research methodology which this study uses to answer the research questions.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

The preceding chapter discussed the relevant literature regarding revenue sourcing in public universities, the challenges surrounding revenue sourcing and the strategies going forward. It also provided the context of DUT. This chapter describes the research methodology adopted to achieve the objectives of this study. The chapter commences with the research design, followed by a description of the research methods, its population, and the employed sampling techniques. Thereafter, an explanation of data collection and analysis are provided. Before closing, the reliability of measurement instrument and its validity are explained and the ethical considerations underlying this study.

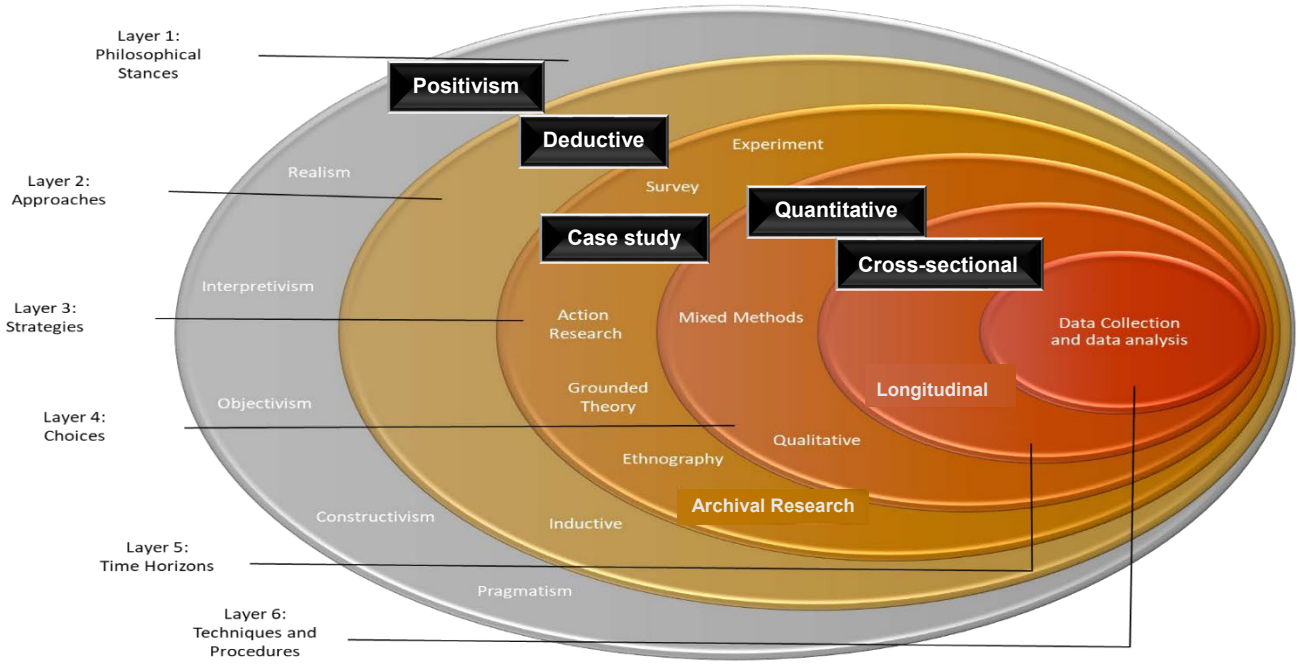
3.2 Research design

As a fundamental instrument to well-informed research, planning has been the key driver in this research's design and content. The logical sequence of the structure from the literature to the conclusion is known as a research design (Sileyew 2019). Such logical sequence becomes the guideline to the research structure, data collection, presentation, and conclusion.

Positivism philosophical stance was chosen in the design process of this study, to align with the needs of a quantitative research method. A deductive approach, was adopted to suit the flow of research content to the conclusion, while aligning with the choice of research method. The research design of this study was a case study research strategy because of its intent and focus to one institution and to allow finds to be characterised as per the set of objectives. Lastly, the study selected a quantitative research method and supported the cross-sectional time horizon to it data analysis.

Saunders, Lewis and Thornhill (2012) used an onion diagram to serve as a guide to selecting the appropriate research method. This is illustrated in Figure 3.1. This research has followed the steps outlined by this diagram in selecting research methods at each of the different layers. The choices made in this study are highlighted in black from layer 1 to layer 6.

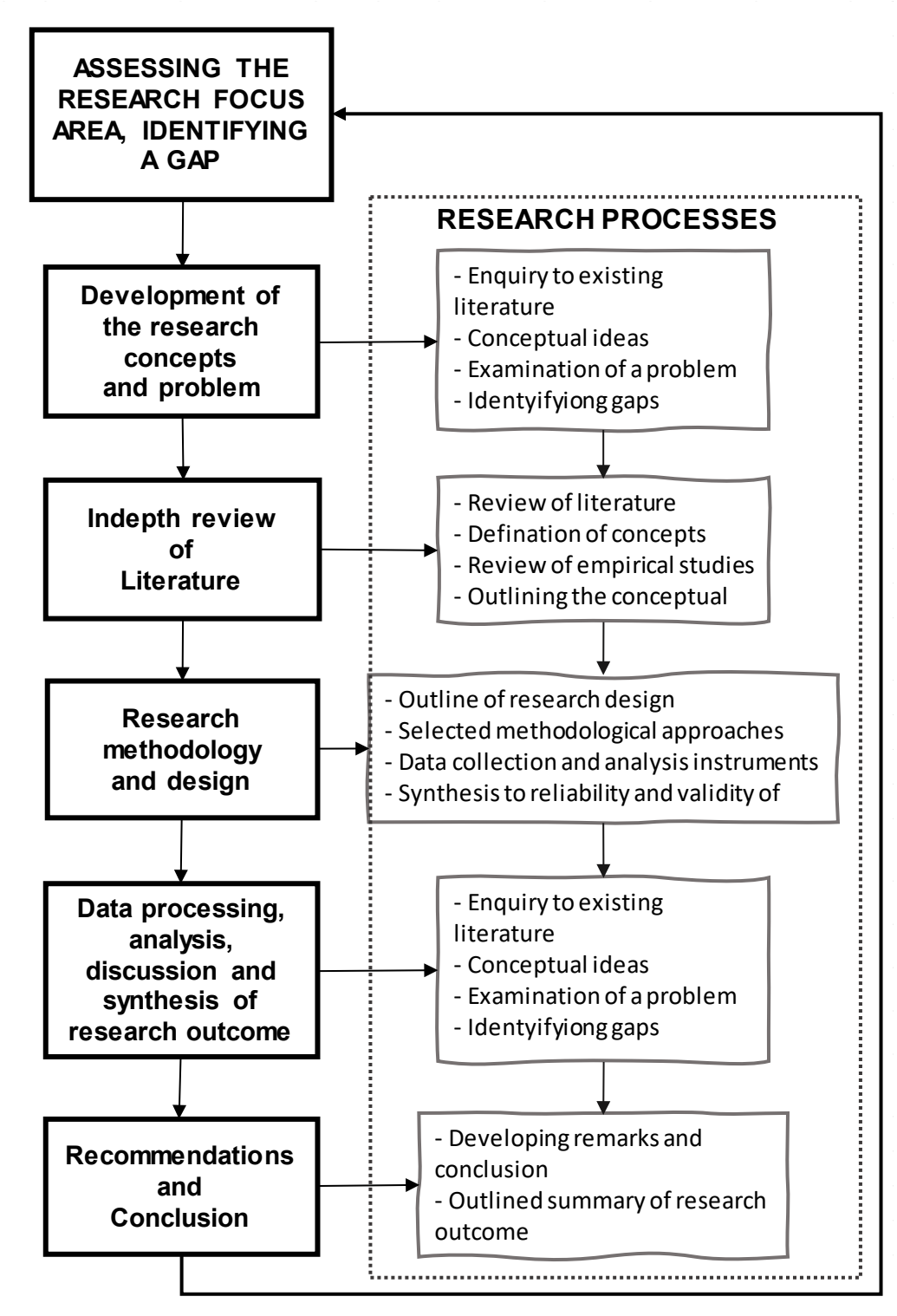
Figure 3.1: Research process



Source: Saunders *et al*. (2012)

The overall design of this research is outlined in the structure given in Figure 3.2.

Figure 3.2: Research flow design



Source: Sileyew (2019: 2)

3.2.1 Research philosophy

There are two commonly used mutually exclusive paradigms as sources of knowledge which are known as positivism and interpretivism (Rule and John 2017). Underlying this research is a positivism research paradigm. Sekaran and Bougie (2016) outlined that a positivist research paradigm depends on quantifiable research outcomes that lead to statistical inferences in analysis. The adoption of positivism often involves recruiting existing theories to develop the research hypothesis (Rule and John 2017). In positivism research, the outcome of knowledge is subjective to statistical measurements that produces a quantifiable result (Swain 2017). As a result of this definition of a positivism research paradigm, this research employed it as a suitable choice to align with the research design and ensure a logical sequence of the outcome derived. It also enhanced the reliability of this research outcomes and ensured that the research responded to its questions and hypotheses. The interpretivism research paradigm would not have been appropriate to the design of this research, hence it was rejected for selection.

To better justify the choice made on selecting a positivism paradigm over interpretivism paradigm, it is important to outline the choice of each of these research methodology designs (that is, qualitative and quantitative), to allow scrutiny of the choices and how they link to each other, as the choice of a research paradigm influences the choice of research method adopted. Therefore, the following section discusses the difference between qualitative and quantitative research methods.

3.2.2 Qualitative research

A qualitative research method is essential in the deriving and gathering of an understanding of the underlying research problem from the designated population at which the phenomenon originates (Bhandari 2020). Rahman (2017) describe a qualitative research method as an umbrella terminology covering a variety of disciplines. He further describes that this research method is concerned with the definitions, patterns of behaviour, and how people interpret things.

Qualitative research is instrumental in interpreting and in developing a better understanding of the complex reality of a given situation (Bhandari 2020).

The results of qualitative data could be extended to people with characteristics similar to those of the research population, providing an enhanced understanding of the phenomenon. However, it is important to understand both research methods to conclude the chosen method better. Hence the next section discusses the quantitative research method.

3.2.3 Quantitative research

Quantitative research is often referred to the type of research assembling data according to quantity or aggregative form (Mohajan 2018). According to Kumar (2014), quantitative research allows the research findings to be numerically presented and statistically analysed. Unlike the data of qualitative research, quantitative research data is measurable by associating numbers to the presentation of data, whereas qualitative data presents complex definitions of the described phenomenon. Quantitative data is associated with the positivism research paradigm (Snyman 1993). To compare the qualitative and quantitative research methods, a comparison of the key factors on how they are used under each research method is discussed next.

3.2.4 Qualitative and quantitative approaches comparison

The differences between the quantitative and qualitative research approaches are shown in Table 3.1.

Table 3.1: Differences between quantitative and qualitative research approaches		
Driver	**Qualitative**	**Quantitative**
Data Collection techniques	- Rich in data - Drawn from interactive instruments with sample population (interviews)	- Data is specific - Based on experiments and questionnaire
Sample size	Small population	Large population
Data collection	On-going observation and Interview	Before and after training or experiment
Research content	Uncontrolled	Controlled
Data analysis	Includes analysing and interpreting context	Includes statistical inferences
Data type	Textual, opinions, perception of others	Data is quantifiable from known outcome being studied.
Data instruments	Researcher as an instrument	Use of questionnaire and survey
Research tools	Researcher as an object, recording devices, papers, and computer	Computer and calculator
Interpretation of Results	Subjective Nature of enquiry	Objective Interpretivism Positivism
Area of concern	Generating theories	Hypothesis testing
Reliability	Low	High
Validity	High	Low
Source: Sileyew (2019: 6)		

The comparative illustrated in Table 3.1, allowed the researcher to make a clear choice between quantitative or qualitative. Considerations were based on the data instrument, type, collection and analysis; sampling; content of research; results, reliability and validity. Drawing from the critique around these factors, the quantitative research approach was selected for this study. An aggregation of opinions from data to using statistical measurements is pivotal to the conclusions drawn in this research.

Although qualitative data may be informative and complex, quantitative data will give meaning to the data by associating it to the probabilities of the social context of the research (Kumar 2014; Sekaran and Bougie 2016). As this research

focuses only on DUT, the next section discusses why a case study research design was the selected approach with its underpinned methodology.

3.3 Research method

This research study is a case study, with the choice of the method being a quantitative research approach. Case study research may differ in the context of coverage by the various types of case studies: exploratory, casual, and descriptive case studies (Rule and John 2017: 8).

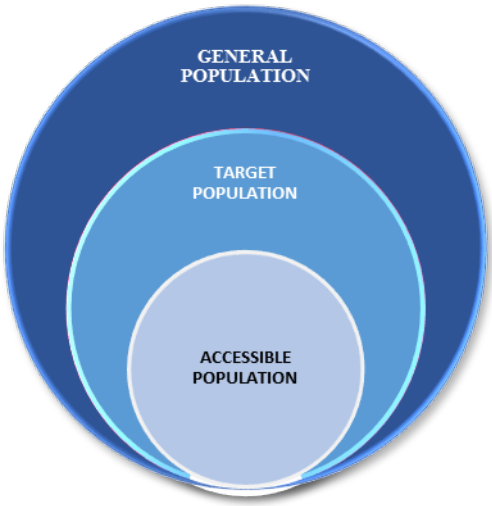
The choice of this study is an exploratory case study because of its intended aim to explore the context of research and gain an understanding of each phenomenon under study, that is, revenue sources and financial sustainability of DUT as a study like this one has not been conducted at DUT before. This differs slightly from the definition given by Thomas (2016); O'Gorman and MacIntosh (2015), as supporting theories have already been developed to support this exploratory study.

The research uses mainly primary data to answer the research questions and enhance the reliability and relevance of the current study. The time horizon of the research is cross-sectional as the data was collected at one point in time (Kumar 2019).

3.4 The target population

A population is the complete set of the target group to which the research is subjected; this selection is used as a domain for the context of the research (Whitley Jr. and Kite 2018: 485). A population may also be referred to as a category of persons to which research outcomes could be applied (Whitley Jr. and Kite 2018: 485). Weathington *et al*. (2012: 46) defined a target population as the population to which the research would like to generalise its findings. According to Asiamah, Mensah and Oteng-Abayie (2017), often the words 'population' or 'target population' may be interpreted differently. However, the relationship may be illustrated in practical terms from general population to target population to accessible population as shown in Figure 3.3.

Figure 3.3: Target population derivation



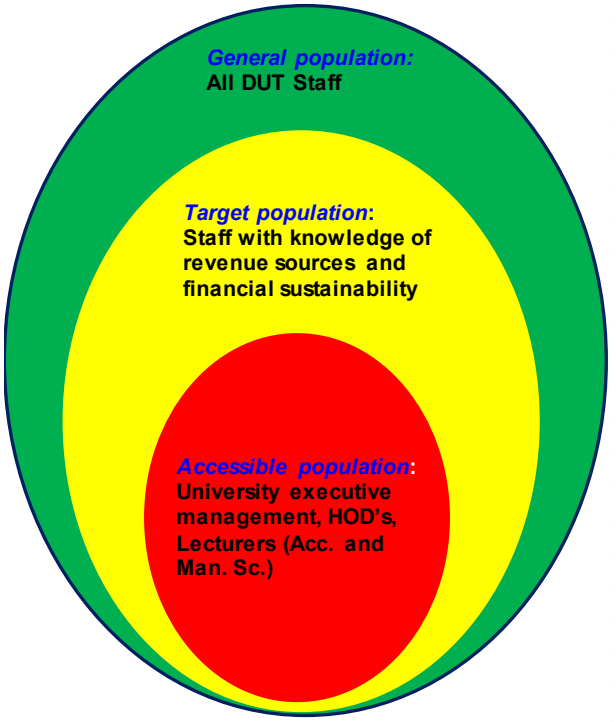
Source: Asiamah, *et al.* (2017: 1611)

As the study is the case study of DUT, the population could comprise all DUT staff members. However, for this study, an in-depth knowledge of the topic was necessary to enhance the findings of the research. Therefore, only staff involved in the university's financial matters or those who had a sound knowledge of finance and accounting were regarded as the target population. These staff members were grouped into categories based on the knowledge and judgement of the researcher.

The target population thus included members from managerial positions of the university, the executive management and departmental heads, and the administrators of finances in the finance department. Lecturers from the Accounting and Management Sciences cluster were also targeted as they have necessary financial knowledge and expertise to answer the research questions. The managerial officers and finance officials are in the forefront of spearheading the generation of university income and they have intimate knowledge of the current practices and developments in the income sources at DUT. Furthermore, they contributed an enormous amount of knowledge and degree of confidence to the research and the researcher's understanding.

For this research, the population was established as per the concept diagram of Asiamah *et al*. (2017: 1611).

Figure 3.4: Selecting sample population



Having established the population of this research, it is important to understand, "how it is then sampled?" The next section explains the sample design and techniques adopted by this research.

3.5 Sample design or framework

Singh (2018) explains that a sample is the representative subset of the research population. Sampling is selecting units from the population to form a frame that serves as a directory to the research (Lammers and Badia 2013). The sample framework then becomes the guideline to the methodology design, selecting participants and reducing the ambiguity of data collection (Singh 2018). The research process could be time-consuming, especially in quantitative research when a general population is explored, affecting its reliability and validity (Goundar 2012).

3.5.1 Sampling techniques

Sampling techniques eliminate unnecessary data collection by focusing on relevant data collected from a sub-group of the population called a sample, rather than on the entire population (Gounder 2012). Sampling can therefore be used to make inferences about the population or the generalisation of existing theories (Taherdoost 2016). The choice of sampling techniques may vary.

Probability sampling and non-probability sampling are two types of sampling methodologies. Random sampling, also known as probability sampling, is a sampling process in which each participant or study element has an equal chance of being chosen (Krippendorff 2013: 485). Simple random sampling, systematic sampling, stratified sampling, and cluster sampling are some of the most often used random sample methods (Gounder 2012).

With non-probability sampling, contrary to probability sampling, the chances of selection are unequal and uneven, and certain members of the population may have no chance at all of the selection (Kumar 2014). The probability that a participant or unit will be included in the sample cannot be specified (Creswell and Clark 2018: 174). The quota sampling, snowball sampling, convenience sampling, consecutive sampling and judgemental sampling mainly used non-probability sampling methods.

This research adopted a non-probability sampling technique. Judgmental sampling, also referred to as purposive sampling, was used. This sampling method is considered as a strength in an exploratory research design (Taherdoost 2016) as it contributes to concrete and solid findings from the research and ensures that accurate or reliable data is collected (Krippendorff 2013: 485). It assisted meaningful findings from this research derive from informed participants rather than generalising a sample to the population.

According to Kumar (2019), selecting participants to form a sample of the research in judgmental sampling depends on the researcher's knowledge and judgement of their expertise. Judgmental sampling ensured that adequate and sufficient data was collected from the selected population with sound knowledge and background of revenue sources at public universities.

The sample was derived from the University management, HoDs academic lecturers from Faculty of Accounting and Informatics and Faculty of Management Sciences and finance officers. Although it is ideal for the researcher to sample categories from all DUT staff, to ensure reasonably informed participants on the study's topic are selected, the researcher's judgment was used. At the same time, some HoD's from Faculties other than the Faculty of Accounting and Informatics did indicate that they had minimal knowledge on the research topic. This claim validated the researcher's judgement, as per the judgemental sampling technique. As the field of this study is topical, among all university stakeholders, ideally inference is made to the inclusion of students for their claims on the tuition fee crises in particular. However, the study sought to use literature review to unpack such opinions as they underly demand free education.

The next section discusses the data collection process.

3.6 Data collection

In a case study, research data may come from various sources (Yin 2014: 103; Rule and John 2017). According to Swain (2017: 141), the process of data collection is a system of gathering and measuring information on the research variables to respond to the problem and objectives of the research.

Data can either be primary or secondary data. Primary data collection is the process of direct collection of data from the research participants and its methods may vary from in-person, telephonic, mails or other direct person's contact (Kabir 2016: 204). Secondary data is data drawn from already published sources. The contrast between the two data sources is that primary data requires a researcher's efforts, liaising with other people as participants, whereas secondary data is extracting information that is already published from the internet or other forms (Martins, Da Cunha and Serra 2018).

This study used primary data obtained from a questionnaire designed with Likert-scale type questions. The questions were designed to provide data to address the research questions. The questionnaire was administered using emails and other online support facilities such as Microsoft Teams and telephone calls.

3.7 Recruitment, consent and data collection procedures

The target population was recruited by using their work email addresses available on the internet. They were first sent an email with an electronic (online) consent letter inviting them to participate (See Appendix A). After indicating their consent, they were then provided with the link to an online questionnaire. In some instances, after a national easing of the Covid-19 restrictions, the researcher reached out telephonically or in person to some members of the target population to encourage them to participate in the research.

This whole recruitment and data collection stage was done, ensuring absolute anonymity and with the most significant degree of confidentiality as there was no identifying information asked in the questionnaire, nor were their IP addresses cloned or logged.

3.7.1 The measuring instrument

The instrument selected for this research was a questionnaire.

3.7.2 The questionnaire

The questionnaire was designed using mainly Likert-scale questions (Maree 2019: 208; Kabir 2016*-: 132-137). The questionnaire had three sections: a section asking for the background information, a section exploring the research variables which were revenue sources and financial sustainability and a third section where a “yes or no” responses was required, and which was then followed with open-ended questions. This background information was considered important to give meaning to the data and provide a deeper analysis of the collected data. The second section assessed their knowledge in the subject matter, revenue sources and financial sustainability and thereafter asked relevant questions to meet the study's objectives.

3.7.2.1 Open-ended and closed-ended questions

Questionnaire design is guided by the research methodology selected for the research and may vary in qualitative and quantitative research. The main decision made in this research was deciding on open-ended or closed-ended

questions. According to Sreejesh, Sanjay and Anusree (2014), open-ended questions enrich the responses from the respondents, which although not ideal to the research, allows some element of a qualitative research method. Closed-ended questions are ideal for a quantitative research approach as it enables a statistical measurement of responses; in contrast, open-ended questions may not be statistically measured (Maree 2019: 202). This research adopted a closed-ended question type as it was a quantitative study. However, to allow respondents an opportunity to offer their opinions beyond the closed-ended questions, the questionnaire ended with two open-ended questions.

3.7.2.2 Questionnaire layout

Sekaran and Bougie (2016: 149) discussed some principles in questionnaire design to reduce biases such as the wording of the questionnaire, variables categories, scales, and codes after receipts of the responses and the general appearance of the questionnaire. The layout and language of the questionnaire are essential as it could determine the participants' responses (Sekaran and Bougie 2016). The language of the questionnaire must also be suited to the level of the respondents' understanding (Maree 2019). This research employed mainly a Likert-scale question type, where participants were asked to mark appropriate boxes to indicate their responses to closed-ended questions using a scale of 1 = strongly disagree to 5 = strongly agree.

The questionnaire consisted of closed-ended questions with two open-ended questions and was divided into three sections (see Appendix C).

Section A - Personal and biographical details

In this section, the respondents were asked to indicate their sample category, gender, age, highest qualification, Faculty under which highest qualification was obtained, and experience in higher learning institutions.

Section B - Revenue sources at institutions of higher learning

The respondents were asked to rate their knowledge of DUT's revenue sources and financial sustainability using a scale of 1 = poor to 5 = advanced. This section

of the questionnaire consisted of the statements underlying this research. These statements were derived after reviewing related articles (Sekaran and Bougie 2016; Maree 2019). The statements were in the following areas: DUT funding challenges, evaluating first stream income, second stream income and third-stream income, and lastly revenue generation strategies at DUT.

Section C – Open-ended questions

This section was used to enrich the research findings and allow respondents to interact with this research topic. The respondents were asked if there was anything more, they would like to add about DUT's revenue sources and financial sustainability.

3.7.2.3 Pretesting the questionnaire

To confirm the suitability of questionnaire, the questionnaire was pretested. Pretesting is a preliminary step undertaken in research to evaluate a questionnaire's effectiveness, reduce errors, and detect possible deviations and unnecessary questions (Maree 2019: 260-264). This process assists in the evaluation of possible adverse consequences, the related cost and the time taken for the data collection. Pretesting was conducted by administering it to three management accounting experts for their expert opinions and review. Thereafter it was distributed to nine DUT staff members (two from CELT department, two from the Faculty of Accounting and Informatics, three from the finance department and two from the student housing department) as part of the pretesting process. In total, the pretest was done with 12 people.

The outcome from the pretesting indicated that firstly, some questions were not clear as to what was being investigated, and secondly, some questions were not aligned with the research objectives. After making the necessary changes, the responses were then submitted for statistical analysis by a statistician who confirmed the questionnaire to be well suited for the study.

The questionnaire was then uploaded onto Questionpro, an online survey tool, and it was checked multiple times to ensure that it was the same as the hardcopy questionnaire.

3.7.2.4 Participants' consent

Participants were first contacted using their email addresses publicly available in the DUT website to invite them to partake in the study. This was done to assure them of their anonymity and their confidentiality as far as their emails were concerned, and that their names would not be disclosed in any of the research processes. The invitation included a link to an online consent and information letter. The administering of the questionnaire was done after the respondents had signed the consent letter. The consent letter and questionnaire were separated to maintain anonymity and confidentiality, and the questionnaire was completely anonymous, as it did not include names or email addresses.

The participants were also informed about the nature of their participation, that it was voluntary, cost and risk free, and exposed them to no harm or risk.

3.7.2.5 Distribution of the questionnaires

After being granted ethical clearance, a link to the questionnaire was administered through emails to the respondents from 29 September 2020 to 2 December 2020. A total of 215 participants were invited to partake in this research. Only 162 responded to the invitation, and they were all provided with the link to an online questionnaire. Respondents were given adequate and reasonable time to respond to the questionnaire.

3.7.2.6 Response rate

Very few respondents responded to the questionnaire the first time it was sent. Only 19 responded; however, reminders through emails were helpful and in some other cases, in-person reminders boosted the response rate and, in most cases, reminders were sent more than once. However, had the study been carried out solely based on emails, the response rate would have been very poor and non-reliable for the outcomes. Hence, these different modes of encouraging the respondents resulted in an overall response rate of 67% as shown in Table 3.2.

Table 3.2: Response rate

	Time allocated	Total invite sent	No of participants who attempted to respond	No of respondents who completed the questionnaire
Numbers	63 days	215	162	144
Percentages		100%	75.34%	66.97%

Table 3.3 shows the overall response rate, and response rate per the sample categories.

Table 3.3: Analyses of responses			
Sample categories	**Distribution rate**	**Response rate**	**%**
Executive management	16	11	8
Heads of Departments	52	49	34
Academic lecturers	122	69	48
Finance officers	25	15	10
Aggregate	215	144	100

3.8 Data analysis and statistical measurements

According to Taheri, Porter, Valantasis-Kanellos and Konig (2015), the data after being collected undergoes steps to be analysed and expressed as reliable research outcomes. These steps involve data coding, editing, and cleaning. Data analysis may be interpreted as a method of gathering figures and facts together to resolve the underlying research problem; it is also an important research instrument to respond to the research questions (Ponto 2015). The process of data analysis is a crucial research stage as it converts the research data into a readable and meaningful presentation (Bergin 2018). This step in the research connects the research variables by giving them descriptions of their variation (relationship), frequency and reliability (Coe, Waring, Hedges and Authur 2017). This study analysed quantitative data using statistical descriptions or inferences (Maree 2019: 229 and 255). The Statistical Package for Social Sciences (SPSS version 26.0) (renamed as Statistical Product and Service Solutions) was used. The data was first captured using Microsoft Excel and thereafter imported into SPSS.

The data for any negative statements was reverse coded to ensure that all statements could be analysed logically and coherently.

3.8.1 Descriptive statistics

Descriptive statistics were used to describe the basic features of the research findings. This statistics measurement model converts the data in a manageable form as large amounts data may be reduced into a simpler summary (Trochim 2020). Descriptive statistics are used to present data more meaningful, enabling a simpler data interpretation (Singh 2018). Descriptive statistical models use frequencies, percentages, and tables as forms of data presentation (Trochim

2020). These descriptive statistics were used to interpret bibliographic information of the respondents and in the actual data analysis.

The results from the descriptive analyses were presented in the form of charts, tables, crosstabulations and other figures.

3.8.2 Inferential statistics

Inferential statistics use data derived from the sample to make inferences about the research population from which the sample was drawn. The overall purpose of inferential statistics is to derive conclusions on the sample and generalise them to a population (Singh 2018). Trochim (2020) states that inferential statistics may be used to make a probability judgement on the difference and relationship between the research phenomenon under study. Hence inferential statistics were used to conclude the population from which the sample was drawn. It was also used in the discussion of the phenomenon under study, drawing from the research objectives.

The next section describes the inferential statistics that were used to analyse the results.

3.8.2.1 Chi-square test

Inferential testing was done using a chi-square test and p-values were utilised to interpret the results. A chi-square goodness-of-fit test was used to determine whether the scoring patterns per statement were significantly varied per choice. Based on the null hypothesis, a similar number of respondents scored similarly for each statement (Kabir 2016). The alternative states that the rate of agreement and disagreement varies significantly. The results are shown in the relevant tables presented in Chapter 4. P-values less than 0.005 and 0.001 were highlighted as indicating the significant differences in the respondents scoring, implying that the distributions were not similar.

3.8.2.2 Mann-Whitney U test

Where the sample distributions are not normally distributed, the Mann-Whitney U test (also known as the Wilcoxon rank-sum test) was used to compare the

differences between two independent samples, to test whether the independent samples have any significant differences in their scoring of the statements being investigated (LaMorte 2017).

3.8.2.3 Structural equation modelling

Structural equation modelling (SEM) is a multivariate statistical analysis method for examining structural relationships (de Carvalho and Chima 2014: 6). This method, which combines factor analysis and multiple regression analysis, examines the structural link between measured variables and latent constructs (de Carvalho and Chima 2014: 6). For this reason, SEM was chosen instead of regression analysis to test the hypotheses developed in Chapter Two.

This study also used factor analysis to confirm that the statements used in the questionnaire to measure the variables, were aligned to each variable. The results of the factor analysis are presented next.

3.9 Factor analysis

Factor analysis is a statistical technique whose main goal is data reduction. Factor analysis is an essential statistical tool to ensure that the statements used to measure the research questions are in meaningful sets of sub-groups called variables. Factor analysis assists in determining the relationship among research objects or factors and assemble these objects into groups according to their relationships. Factor analysis can be used to establish whether the variables of the research study measure the same theme (Sekaran and Bougie 2016). Although the questionnaire had already placed the statements into categories, factor analysis was used to ensure that the statements had been correctly placed. Furthermore, it also ensured whether there were any sub-categories within the main categories as indicated by the questionnaire.

Thus, factor analysis was instrumental in measuring the constructs from the questionnaire and assembling them into categories as per the variables of this research. This was to ensure that the statements did measure the variables identified factors as outlined in Chapter Two. The following sections describe the procedures which underpin factor analysis and its results.

3.9.1 Kaiser-Meyer-Olkin (KMO) and Bartlett's tests

Before factor analysis could proceed, it was necessary to check whether the data met the requirements that the Kaiser-Meyer-Olkin (KMO) Measure of Sampling Adequacy should be greater than 0.50 and Bartlett's Test of Sphericity less than 0.05 (Bhuiyan and Gani 2015). These tests are described next.

3.9.2 The results of the KMO and Bartlett's tests

The KMO Test is an indication of the suitability of the data for factor analysis. Bartlett's Test of Sphericity tests the hypothesis that the matrix of correlation is an identical matrix which proves that variables are unrelated and therefore unsuitable for detecting structure (Glen 2016).

Table 3.4: KMO and Bartlett's Test

Section	Kaiser-Meyer Olkin (KMO) Measure of Sampling Adequacy	Bartlett's Test of Sphericity		
		Approximate Chi-Square	df	Sig.
DUT's funding challenges experienced	0.793	219.904	21	0.000
First-stream income	0.732	107.900	10	0.000
Second-stream income	0.506	65.708	15	0.000
Third-stream income	0.722	183.426	15	0.000
Revenue generation strategies at DUT	0.739	570.281	78	0.000

As indicated in Table 3.4 all the conditions were satisfied for factor analysis. The KMO Measure of Sampling Adequacy values are acceptable as they should be greater than 0.500 and the Bartlett's Test of Sphericity values were less than 0.05 respectively (Bhuiyan and Gani 2015).

3.9.3 Rotated component matrix

The rotated component matrix is a divisional indicator of outputs that highlights the relationship among factors and their respective components (Rajagopalan 2019). The extraction method was principal component analysis, and the rotation method was Varimax with Kaiser Normalization. This is an asymmetrical rotation strategy that reduces the number of variables on each factor with high loadings. It makes interpreting the factors easier.

Inter-correlations between variables are shown through factor analysis/loading. Question items that loaded similarly imply that they were measured along with the same factor. The various components were effectively measured by examining the content of items loading at or above 0.5 (and utilizing the higher or highest loading in cases where items cross-loaded at greater than this value).

The following tables show the factor analysis of the various sections of the questionnaire that addressed the investigated areas.

Table 3.5: Funding challenges

	Component/Theme	
	Main	Alternate
Revenue sourcing is a financial challenge for the university		
The knowledge and skills of university management are the barriers to university revenue generation strategies	0.132	0.765
Low research output, is among reasons for low state funding, through block grants	0.412	0.175
The university post-graduate students complete their degrees within the minimum timeframe which enhances research output	0.118	0.746
The university staff have adequate knowledge to generate additional strategies for revenue sourcing	0.733	0.126
The university staff have adequate resources to generate additional strategies for revenue sourcing	0.857	0.127
The university is able to improve its infrastructure and thereby increase student enrolments	0.762	0.186
DUT is able to attract personnel with experience in attracting funding for the university	0.746	0.008

Note: The loading per component/theme indicates the respondent's interpretation of statements, accordingly the statements are measured main or alternate.

Extraction Method: Principal Component Analysis

a. 1st component extracted, as main: the respondents interpreted the statements as they were intended.
b. 2nd component extracted, as alternate, the respondent retrieved different pattern of understanding which is slightly different from what was intended.

Table 3.5 shows that the statements in this section were grouped into two components: the main component and the other as the alternate component. The alternate component was given a sub-theme of "factors affecting financial sustainability of the university". The loading in this section allowed exploration of existing sources of income and challenges thereto in the analysis of the findings.

Table 3.6: Evaluating first-stream income	
	Component/ Theme
	Main
The revenue generated from state subsidy is sufficient to maintain the financial sustainability of the university	0.511
The university could generate more income from increasing its research outputs as per the block grants	0.670
The university's throughput rate is continuously increasing to enhance revenue generated from the state as per the block grants	0.691
The university has the necessary student support mechanisms to improve throughput rates and thereby generate more revenue from the block grants	0.758
The earmarked grants contribute adequately to the overall university development and standards for meeting targets	0.690
Note: The loading per component/theme indicates the respondent's interpretation of statements, accordingly the statements are measured main or alternate. Extraction Method: Principal Component Analysis a. 1 component extracted.	

Table 3.6 shows that the statements in this section were interpreted as one component signifying a clear and concise measuring of the section's intent.

Table 3.7: Evaluating second-stream income			
	Component/Theme		
	Main	Alternate 1	Alternate 2
The block grant earned through research output is an important contributor to DUT's financial sustainability	0.194	0.770	-0.191
The revenue generated from tuition fees is sufficient to maintain the financial sustainability of the university	0.691	-0.267	0.465
The university always meets its enrolment targets	0.661	0.286	-0.280
The university could generate more income from tuition fees if it increases its student intake	0.678	0.176	-0.018
The annual increase of tuition fees is still an effective mode of increasing revenue from second- stream income	0.058	0.725	0.448
The tuition fee freeze had a significant impact on the university's financial sustainability	-0.066	0.039	0.853

Note: The loading per component/theme indicates the respondent's interpretation of statements, accordingly the statements are measured main or alternate.

Extraction Method: Principal Component Analysis

a. 1st component extracted, as main: the respondents interpreted the statements as they were intended.
b. 2nd component extracted, as alternate 1, the respondent retrieved different pattern of understanding which is slightly different from what was intended.
c. 3rd component extracted, as alternate 2, the respondents retrieved 2nd differing component.

Rotation Method: Varimax with Kaiser Normalization.

Rotation converged in 8 iterations.

Table 3.7 shows that the factor loading in this section implied there were two deviating components from the main theme. The two deviating components were given sub-themes: "financial sustainability factors" and "reflection on income freeze" as per alternate 1 and 2.

Table 3.8: Evaluating third-stream income		
	Component/Theme	
	Main	Alternate
The revenue generated from third-stream income is sufficient to maintain the financial sustainability of the university	0.040	0.887
University segments are offering short-courses and certificates to enhance university financial sustainability	0.644	0.341
The university has strategic teams working with donors to attract more funds from donor funding	0.654	0.395
The university is offering commercialised services to the external community	0.825	-0.142
The university has adequate research contracts contributing to the enhancement of third-stream income	0.303	0.724
The university has investment portfolios aimed at greater returns	0.635	0.264

Note: The loading per component/theme indicates the respondent's interpretation of statements, accordingly the statements are measured main or alternate.

Extraction Method: Principal Component Analysis

a. 1st component extracted, as main: the respondents interpreted the statements as they were intended.
b. 2nd component extracted, as alternate, the respondent retrieved different pattern of understanding which is slightly different from what was intended.

Rotation Method: Varimax with Kaiser Normalization.

Rotation converged in 3 iterations.

Table 3.8 shows that statements loaded perfectly with only two statements deviating theme from the section's main theme; the factors on the deviating theme were grouped into a sub-theme of "third stream income contribution to financial sustainability".

Table 3.9: Revenue generation strategies

	Component/Theme			
	Main	Alternate 1	Alternate 2	Alternate 3
Diversification of revenue sources is the key solution to the university's financial sustainability	-0.353	0.351	0.657	-0.158
Financing university through single source revenue (that is, either first, second or third-stream income) is a financially sustainable decision	0.821	-0.107	-0.337	0.184
The university segments can partner with industry to conduct a need analysis and identify possible short courses	0.185	0.092	0.124	0.816
The university segments are essential pillars for generating additional revenue strategies for the university	0.178	-0.031	0.690	0.330
The university have necessary strategies and skills to enhance revenue from third-stream income	0.633	0.028	-0.096	0.153
The university is offering commercialised research to the external community as a model of sourcing more funds for the university	0.346	0.579	0.332	-0.266
The university's commercial ventures to the external community includes consultancy and professional services	0.759	0.045	0.251	-0.124
Implementation of new course offerings is a contributor to the university's financial sustainability	0.038	0.692	0.172	-0.096
DUT is attracting international students as a model for enhancing its revenue generation strategies	-0.135	0.753	-0.014	0.242
Investment in student support mechanisms is the key solution to increasing throughput rates	-0.155	0.650	0.256	0.162
Expansion of infrastructure is used to increase student enrolments hence growing revenue	0.275	0.594	-0.033	0.562
International collaborations can enhance the research output	0.046	0.382	0.733	0.020
Improved staff qualifications will increase research output	0.651	-0.044	0.281	0.330

Rotation converged in 8 iterations.

Note: The loading per component/theme indicates the respondent's interpretation of statements, accordingly the statements are measured main or alternate.

Extraction Method: Principal Component Analysis

a. 1st component extracted, as main: the respondents interpreted the statements as they were intended.
b. 2nd component extracted, as alternate 1, the respondent retrieved different pattern of understanding which is slightly different from what was intended.
c. 3rd component extracted, as alternate 2, the respondents retrieved 2nd differing component.

Rotation Method: Varimax with Kaiser Normalization.

Table 3.9 shows that factor loading in this section indicated a significant variation into three deviating sub-themes. This deviation highlighted the intention of the section, which was to bring into context various factors underpinning this research into one section and highlight their probable relationship. The deviating components were given sub-themes: “models of sourcing additional revenue”, “recommendation to enhancing revenue generation strategies” and “industrial partnership” as per alternate 1, 2 and 3, respectively.

Most variables that constituted the sections in this rotated component matrix loaded along 2, 3 or 4 components/themes, while one loaded perfectly in one component. This meant that respondents identified different trends within the sections. Within the sections, the splits were colour coded. The components identified as per the respondent’s interpretation were then assembled into sub-themes based on their commonalities and interpretation from respondents.

The factor analysis has highlighted the data reduction and grouping to related components. This type of analysis was used to simplify the analysis which is presented in Chapter Four.

3.10 Presentation of the data

After data collection, the data was analysed and presented in a readable format, using simple tables, diagrams and text to enhance the understanding of the measured constructs.

3.11 Delimitation of scope

In research, delimitation refers to the margins of a study and the basis of deciding which of the research characteristics to be included in a study (Theofanidis and Fountouki 2019). This research was only limited to DUT, KZN, South Africa. The selected participants comprised only the university staff members with the necessary knowledge of income sourcing and financial sustainability.

3.12 Validity and reliability

Reliability in research is defined as the extent to which the study employs a set of tools for analysis that are likely to render the same result if similar studies are

carried out in the future (Heale and Twycross 2015; Swain 2017). Whereas validity can be defined as the extent to which the study adequately measures the variables and concepts of the study in its analysis of the findings (Heale and Twycross 2015; Swain 2017). These are important research validation tools as they would indicate if the research has covered what it intended to cover.

In this research, validity was ensured by accurately covering each outcome intended to be studied: revenue sources and financial sustainability of DUT. The pretesting of the questionnaire also ensured the validity of the research findings.

Reliability was guaranteed by ensuring a concise focus on the research area, which, if related studies are carried out in future the outcomes may probably be similar. Also, participants were selected based on their knowledge of the research area, which meant that they had the knowledge and expertise to provide valid opinions on the area of investigation. In addition, the Cronbach-Alpha test confirmed the reliability of the research questions.

Table 3.10: Reliability of the statistics

	Section	**Number of Items**	**Cronbach's Alpha**
B9	DUT's funding challenges experienced	8	0.679
B10.1	First-stream income	5	0.630
B10.2	Second-stream income	4	0.500
B10.3	Third-stream income	6	0.721
B11	Revenue generation strategies at DUT	13	0.660

After discussing the validity and reliability, it is necessary to outline how anonymity was ensured, as this also underpins the validity of this research. Hence, the next section discusses how confidentiality and anonymity was maintained in this research.

3.13 Confidentiality and anonymity

The data collected in the process of this research was treated with the utmost confidentiality. Participants' anonymity was ensured throughout this research process. The research outcome was used only in an aggregated form and therefore, anonymity of the respondents and the confidentiality of their responses

was assured. The details of participants were not disclosed or available to anyone except the supervisors and the researcher, guaranteeing confidentiality and anonymity of respondents. The completed questionnaires were securely stored. As data was collected using online software, access to the software was limited to the researcher and the software was locked with a password.

3.14 Ethical considerations

Thomas (2016) argues that research participants in social science should be treated as partners in the research process and be allowed to engage with the research and benefit from the overall research work. The only benefit to the participants of this research is an enriched understanding of this research area. The primary data (questionnaire) for this study were collected after consent had been obtained from DUT's institutional research structures, namely, the FREC and the Higher Degrees Committee (HDC). To comply with the FREC, a gatekeeper's letter from DUT's research office was obtained (see Appendix A).

3.15 Summary

This chapter has covered the research approach to address the research questions of this study. This research is a case study (Maree 2019: 89). A quantitative research approach was chosen because of its intended aim of testing its findings using statistics. This chapter also described the research instrument that was used and the methods used for analysing the data. The chapter set out how the validity and reliability of this research was ensured and how confidentiality and anonymity of the research subject and respondents were ensured. The chapter ended by outlining the study's ethical considerations.

The following chapter provides an analysis of the responses of the respondents to the questionnaire.

CHAPTER FOUR

PRESENTATION AND ANALYSIS OF THE RESULTS

4.1 Introduction

The previous chapter discussed the research methodology used in this research. This chapter presents the findings based on the measuring instrument used, the questionnaire, which was used to provide responses to meet the objectives and questions of this research. To recap the questions were:

1. What are the challenges faced by DUT in funding?
2. How does each income stream affect the financial sustainability of DUT?
3. What are suitable revenue generation strategies for public universities in KwaZulu-Natal?
4. How effective are the existing revenue sources in the financing of DUT?

The analysis presented in this chapter follows the structure as per the sections in the questionnaire (Appendix C). The sections in the questionnaire were broken down into headings that aligns to the sequence of the objectives underlying this research. Biographical information was used to enhance the analysis.

The next section provides the background information on the respondents after which the findings relating to the research findings are presented.

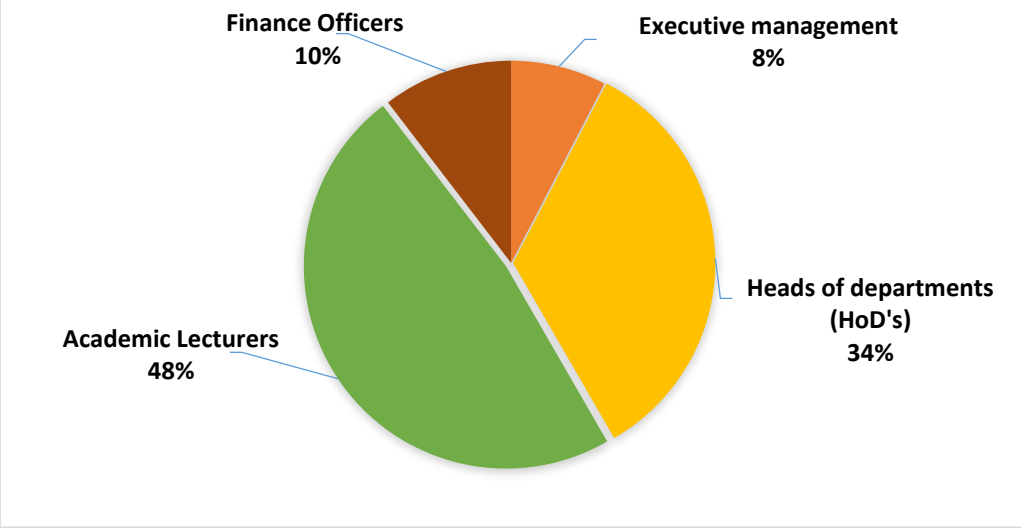
4.2 Biographical data

This section summarises the biographical characteristics of the respondents using descriptive statistics. The range of biographical data presented includes position of the respondents at DUT, gender, educational level, experience and Faculty under which highest qualification was obtained. These questions were asked to ensure that the respondents had the necessary background to provide knowledgeable answers to the questionnaire's statements and allow a richer analysis of the data.

4.2.1 Position of respondents at DUT

Figure 4.1 indicates the positions of the respondents according to their job profile.

Figure 4.1: Respondents categories



Overall, academic lecturers represented (48%) of the sampled categories, which is approximately half of the sample. Where approximately a third were HoDs (34%). There were smaller numbers of executive management and finance officers (8% and 10% respectively). The proportion of the sampled positions fairly reflected the actual DUT population in these categories.

4.2.2 Gender

Table 4.1 shows the gender composition of the respondents. This indicates that female employees were the most significant percentage of the respondents at 54.2% compared to male employees (45.8%). This also highlights a proportionately fair employee gender distribution at DUT and alignment with employment equity.

Table 4.1: Gender distribution

	Number (n)	Percentage (%)
Male	66	45.8
Female	78	54.2
Total	144	100.0

According to the p-test performed, there was no significant difference in the sample by gender (p=0.317).

4.2.3 Educational level

The level of education is an essential pillar to validate the respondents' in-depth knowledge of the higher education sector. To form a view on the respondents' suitability and assess their level of understanding of the areas under investigation, their qualifications were an important factor in measuring the respondents' skills and knowledge. Figure 4.2 below indicates the respondents' educational levels.

Figure 4.2: Educational level

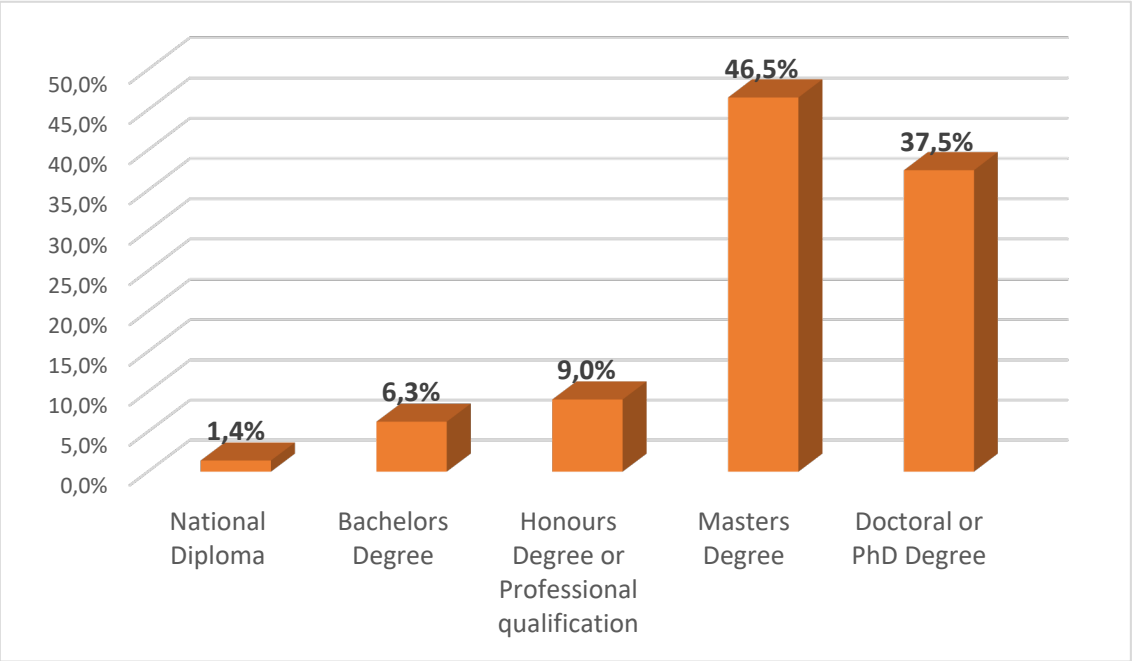


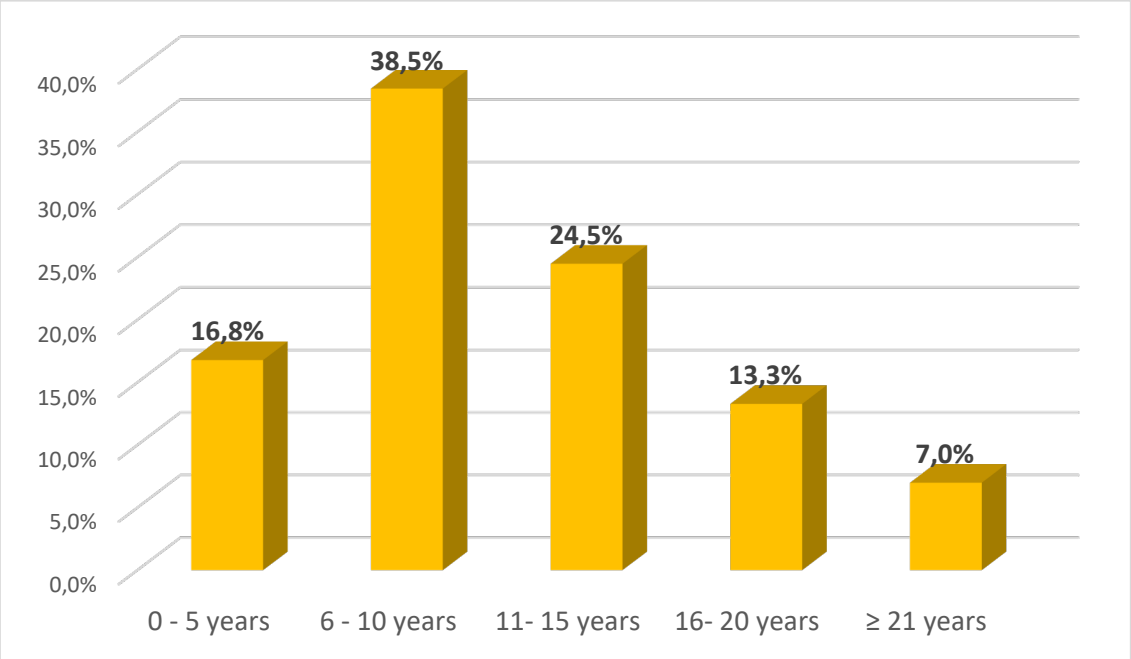
Figure 4.2 shows that only 1.4% of the total respondents had a national diploma or advanced certificate, while the rest possessed degree qualifications at different levels from a Bachelor's Degree, Honours Degree/Professional Qualification, Master's Degree, and a Phd Degree with the percentage of variation ranging from 6.3%, 9.0%, 45.8% and 37.5% respectively. The qualifications identified as being possessed by most respondents were Masters or PhD Degrees with an aggregated value of 83% ($p < 0.001$).

This is a useful statistic as it indicated that most of the respondents have a postgraduate qualification and indicates that the responses would have been from informed and knowledgeable sources.

4.2.4 Respondents' experience

Experience is another important factor in ensuring that respondents are informed personnel within the higher education environment and increases the reliability of the results. Figure 4.3 indicates the length of service (experience) of the respondents.

Figure 4.3: Experience



Measuring experience was necessary to ensure that the respondents were informed members of the university who understand the processes and environment in their field.

Figure 4.3 show that 83.3% of the respondents had been employed for more than 5 years. While 16.7% had 0-5 years' experience in higher education, with 38.9% with experience of 6-10 years' experience, 24.3% with 11-15 years' experience, 13.2% with 16-20 years' experience and 6.9% with above 21 years of experience. This implies that the responses were from experienced staff members.

4.2.5 Faculties of the respondents' highest qualifications

To ensure the suitability of participants to be able to make a valid and reliable contribution to this research, participants were further asked to give details of the Faculty from which they received their highest qualification. Figure 4.4 indicates the faculties from which the respondents obtained their highest qualifications.

Figure 4.4: Faculty under which highest qualification was obtained.

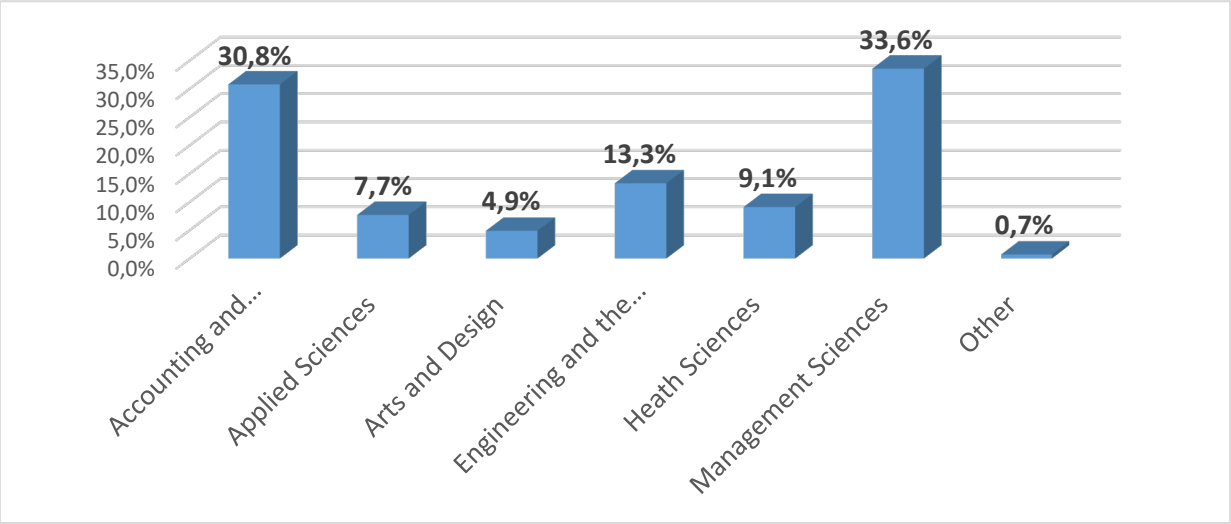


Figure 4.4 shows some variation in the faculties under which the respondents obtained their highest qualification. However, most respondents (64.5%) obtained their highest qualification from the Faculty of Accounting and Information (31.9%) and the Faculty of Management Sciences (32.6%). Respondents with qualifications from these two faculties would know about finance and accounting and would be able to provide expert opinions on the variables under investigation.

4.2.6 Biographical information

Table 4.2 shows a summary to the respondents' background information

.

Table 4.2: Overall biographical responses

Sample categories	Gender		Educational level							Experience (In years)					Faculty						
	M	F	NCS	HC	ND	BD	HD	MD	PhD	0-5	6-10	11-15	16-20	≥ 21	A&I	AS	A&D	E&BE	HS	MS	O
EM	6	5	0	0	0	0	1	2	8	3	3	3	2	0	0	2	2	2	2	2	1
HOD	28	21	0	0	0	2	0	10	37	1	25	19	2	2	7	9	5	12	10	6	0
AL	26	43	0	0	0	3	5	52	9	12	24	12	14	7	25	0	0	5	1	38	0
FO	6	9	0	0	2	4	7	2	0	8	4	1	1	1	14	0	0	0	0	1	0
Total (n)	66	78	0	0	2	9	13	66	54	24	56	35	19	10	46	11	7	19	13	47	1
Total (%)	46%	54%	0%	0%	1%	6%	9%	46%	4%	17%	39%	24%	13%	7%	32%	8%	5%	13%	9%	33%	0.7%

Abbreviations:

Sample Categories: (EM:- Executive Management, HOD:- Head of Department, AL:-Academic Lecturer, FO:- Finance Officers)

Gender: M:- Male, F:- Female

Educational level: NCS:- National Senior Certificate (Matric), HC:- Higher Certificate, ND:- National Diploma or Advanced Certificate, BD:-Bachelor's Degree or Advanced Diploma or B-tech, HD:- Honours Degree or Post-graduate Diploma or Professional qualification, MD:- Master's Degree, PhD:- Doctoral or PhD Degree.

Faculty: A&I:- Accounting and Informatics, AS:- Applied Sciences, A&D:- Arts and Design, E&BE:- Engineering and the Built Environment, HS:- Health Sciences, MS:- Management Sciences, O:- Other.

Table 4.2 shows the biographical data of the respondents. There is a noted variation in the categories among the variables of the biographic data presented. The gender distribution of the executive management was fairly even, with only a one-person difference. The executive management's qualifications varied from Honours Degree to a PhD, with most holding a PhD (72.7%). None of the executive management's members had more than 20 years' experience and their experience varied evenly from 0-15 years to 16-20 years. No members of the executive management who qualified in Faculty of Accounting and Informatics; rather their qualifications were in the other five Faculties at two per Faculty and only one qualified a Faculty from outside DUT. With this aid of analysis, it can be highlighted that respondents from executive management have proportionate equity in gender presentation, with the most holding the highest qualification possible, with experience evenly from 0-20 years and also hold qualifications spread evenly among the Faculties of DUT, with none in the Faculty of Accounting and Informatics and one from a Faculty other than at DUT.

The HoD's were represented by males at 7.1% above females. Most HoD's hold at least a Masters or PhD Degrees (95.9%), and only two hold Honours equivalent Degree. Most of the HoD's have 6-15 years' experience (89.8%), while 8.2% have 16-21 years' experience and above 21 years' experience. Only one had 0-5 years' experience. HoD's were proportionately evenly spread across the faculties of DUT.

The majority of the respondents were academic lecturers because they were the highest category in the sampling. Gender distribution among academic lecturers showed females at 12.3% above males. The academic lecturers' qualifications varied from Bachelor's Degree to a PhD, with most holding a Master's Degree (75.4%), 13.0% holding a PhD and only 11.6% holding a Bachelors/Honours Degree. Academic lecturers' experience varied proportionately from 0-5 to above 21 years' experience. The highest qualification of academic lecturers was mostly from the Faculty of Management Sciences and Faculty of Accounting and Informatics (91.3%), while 7.2% were from Faculty of Engineering and the Built Environment and 1.4% were from Faculty of Health Sciences.

To summarise, the actual percentages varied from executive management at a response rate of 69%, HoD's at 94%, academic lecturers at 57% and finance officers at 60%, all in a total of 67%. The gender distribution was near equilibrium, with no significant difference among female and male respondents ($p<0.001$). The majority of the respondents (84%) had Masters (46.5%) or PhD Degrees (37.5%) as their highest qualifications. The respondents' experience varied proportionately with 6-10 years as the major experience category at 38.5%. Finally, most respondents had obtained their highest qualifications in the Faculty of Accounting and Informatics (30.8%) or the Faculty of Management Sciences (33.6%).

The above analysis indicates that the respondents were able to provide expert opinions to the statements which were used to answer the research questions. Following the questions on the background information, the questionnaire posed questions directly related to the research questions. The following section examines the respondents' score patterns for each variable and section. The findings are provided first as summarised percentages for the factors that make up each component. The data is then analysed further based on the significance of the claims.

4.3 DUT's revenue sources and financial sustainability

This section addresses the research questions posed in Chapter 1. To ensure that the respondents were able to give informed opinions on the variables under study and to validate the assumption made from the respondents' background information (qualifications and experience), respondents were asked about their knowledge of DUT revenue sources and financial sustainability. The scoring scale was in a range of 1 = poor to 4 = advanced. These results are shown in the Table 4.3.

4.3.1 Respondents' knowledge of DUT's revenue sources and financial sustainability

Table 4.3: Knowledge of revenue sources and financial sustainability

		Poor	Moderate	Satisfactory	Good	Advanced	Total	Mean	SD
Revenue sources	n	-	9	28	91	16	144	3.79	0.72
	%	-	6.3	19.4	63.2	11.1	100.0		
Financial sustainability	n	-	11	25	96	12	144	3.76	0.71
	%	-	7.6	17.4	66.7	8.3	100.0		

Note: 1 = poor, 2 = moderate, 3 = satisfactory, 4 = good, 5 = advanced
No respondents chose "poor" as their response

Table 4.3 show that the respondents expressed varying levels of knowledge of the variables of this research, "revenue sources" and "financial sustainability". The knowledge level of the two items was proportionately spread across the responses from moderate, satisfactory, good, and advanced. The mean scoring indicated 3.79 for knowledge of revenue sourcing and 3.76 for knowledge of financial sustainability, thus the average of the responses was between satisfactory and good. Most of the respondents indicated that they have good knowledge at 63.2% and 66.7% respectively. Adding the respondents who indicated either good or advanced knowledge showed that 74.3% and 75% of the respondents were knowledgeable on revenue sources or financial sustainability. In each case, significantly more respondents indicated that their knowledge was good or advanced ($p < 0.001$).

These two questions assessed the capacity of the respondents and the reliability of their responses based on their knowledge. This enhanced the reliability of this research's results and validated the reliability of the sampling framework.

4.3.2 DUT funding challenges

The first research question investigated DUT's funding challenges. A question was posed asking respondents for their opinions on various statements on DUT's funding challenges. These responses are summarised in Table 4.4.

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Table 4.4: Funding challenges													
	Level of Disagreement				Neutral		Level of Agreement				Mean	Standard deviation	Chi square p-values Sig.
	Strongly Disagree		Disagree				Agree		Strongly Agree				
	n	%	n	%	n	%	n	%	n	%			
Revenue sourcing is a financial challenge for the university.	0	0.0	23	16.0	11	7.6	104	72.2	6	4.2	3.65	0.80	<0.001
The knowledge and skills of university management are the barriers to university revenue generation strategies.	3	2.1	67	46.5	5	3.5	48	33.3	21	14.6	3.12	1.21	<0.001
Low research output, is among reasons for low state funding, through block grants.	2	1.4	8	5.6	8	5.6	119	82.6	7	4.9	3.84	0.65	<0.001
The university post-graduate students complete their degrees within the minimum timeframe which enhances research output.	2	1.4	63	43.8	9	6.3	83	43.8	7	4.9	3.07	1.06	<0.001
The university staff have adequate knowledge to generate additional strategies for revenue sourcing.	2	1.4	12	8.3	17	11.8	97	67.4	16	11.1	3.78	0.80	<0.001
The university staff have adequate resources to generate additional strategies for revenue sourcing.	3	2.1	13	9.0	10	6.9	110	76.4	8	5.6	3.74	0.78	<0.001
The university is able to improve its infrastructure and thereby increase student enrolments.	3	2.1	5	3.5	3	2.1	111	77.1	22	15.3	4.00	0.71	<0.001
DUT is able to attract personnel with experience in attracting funding for the university.	2	1.4	3	2.1	8	5.6	112	84.7	9	6.3	3.92	0.57	<0.001

Table 4.4 indicates that some statements show (significantly) higher levels of agreement whilst other levels of agreement are lower (but still greater than levels of disagreement). Only the statement on knowledge and skills of university management as the barriers to university revenue generation strategies had a slightly higher level of disagreement.

Table 4.4 indicates that the outcome on analysing the funding challenges encompassed by the university presented means varying from 3.07 to 4.00 among the statements measured. These outcomes indicated the higher agreement level in most statements, whereas in some there was a neutral or balanced response among the options. The mean can be interpreted in two ways, that is neutral or agree. The scoring levels of 3.07 to 3.49 were interpreted as neutral in rounding to the nearest whole number of 3, whilst scoring of 3.50 to 4.00 was interpreted as agreeing in rounding to the nearest whole number of 4. From this interpretation, most statements presented the highest agreement level, while two of them (‘knowledge and skills of the university management are barriers to university revenue generation strategies’ and ‘university post-graduate students complete their degrees within the minimum timeframe which enhances research output’) indicated a neutral response level. For most statements, the standard deviation highlighted an insignificant spread of 0.00 to 0.90. However, the standard deviation showed a significant spread of 1.00 for the two statements highlighted above. All the statements indicated a statistically significant spread of responses across the rating scales ($p<0.001$).

Focusing on the individual statements, most respondents agreed that revenue sourcing is a financial challenge for the university at a 76.4% level of agreement, supporting that the university does have a financial sustainability crisis which also supports the empirical review by Saudi (2019). Low research output was also among the reasons assumed by respondents for low state funding at an agreement level of 84.5%. In comparison, the university staff were perceived as possessing sufficient knowledge and resources to assist the university revenue generation strategies at an agreement level of 78.5% and 82%, respectively. The results further indicated that the university can improve infrastructure to increase student enrolment and has the personnel with experience handling the

university's funding strategies at an agreement level of 92.4% and 91%, respectively. The respondents were more or less neutral to the statement that the university management has sufficient knowledge and skills to generate strategies for revenue sourcing, with a 48.6% level of disagreement, 47.9% level of agreement and 3.5% neutral responses. The respondents were more or less neutral to whether the university post-graduate students complete within the minimum timeframe, which enhances research output, with a 45.2% level of disagreement, 48.7% level of 47.9% agreement and 6.3% neutral responses.

The trend in responses as highlighted above supports both the underlying theories in this research. Neoliberalism is highlighted by the varying responses from respondents that people often differ in their perceptions of some context. While the resource dependency theory highlights the dependency of these factors to each other and the relationship they share towards financial sustainability.

This section intends to highlight if financial sustainability is a challenge for the university and, if so, identify key revenue generation enablers that hinder financial sustainability. Table 4.5 below shows an interpretation of the statements and their contribution to financial sustainability.

Table 4.5: Factors affecting financial sustainability

Factors	**Hindrance or Non-Hindrance**
Revenue sourcing	Hindrance
Low research output	Hindrance
University management knowledge and skills	Hindrance
Post-graduate completion	Hindrance
University staff knowledge	Non-hindrance
University staff resources	Non-hindrance
University infrastructure	Non-hindrance
University higher people with experience	Non-hindrance

Table 4.5 above highlighted revenue sourcing as a financial challenge to the university.

The factor analysis presented in Table 3.6 shows that all the statements shown in Table 4.4 were grouped into two components, one as the main component and the other as the alternate component. The alternate component was “knowledge and skills of university management are barriers to university revenue generation strategies” and “university post-graduate students complete their degrees within the minimum timeframe, enhancing research output”. This alternate component was given a sub-theme of “factors affecting financial sustainability of the university”. The analysis of Table 4.4 indicated that respondents were neutral in their opinions on these two statements.

To summarise, the main finding(s) concerning DUT’s funding challenges are:

- Revenue sourcing is a financial challenge for the university.
- Low research output is among the reasons for low state block grants funding.
- University staff have adequate knowledge to generate additional revenue sourcing strategies.
- University staff have adequate resources to generate additional revenue sourcing strategies.
- The university can improve its infrastructure and thereby increase student enrolment.
- The university attracts personnel with experience in attracting funding for the university.

As much as the university has a financial challenge, however, the financial challenge does not arise due to a shortage of knowledge, skills, experience, resources and infrastructure. The low state block grant is among the factors that impose a financial challenge to the university.

4.3.3 Evaluating each income stream

The second research question was to determine how each of the income streams affects the financial sustainability of DUT.

The income categories were divided into three streams: first stream income, second stream income and third-stream income. Each of these income streams

was probed using different statements in the questionnaire. Respondents were able to indicate their opinions using a rating scale of 1 = strongly disagree to 5 = strongly agree.

4.3.3.1 First-stream income

The results of the question probing various statements on first-stream income are shown in Table 4.6.

Table 4.6: First-stream income													
	Level of Disagreement				Neutral		Level of Agreement				Mean	Standard deviation	Chi square p-values
	Strongly Disagree		Disagree				Agree		Strongly Agree				
	n	%	n	%	n	%	n	%	n	%			
The revenue generated from state subsidy is sufficient to maintain the financial sustainability of the university.	3	2.1	74	51.4	9	6.3	52	36.1	6	4.2	2.89	1.06	<0.001
The university could generate more income from increasing its research outputs as per the block grants.	1	0.7	1	0.7	1	0.7	122	84.7	19	13.2	4.09	0.47	<0.001
The university's throughput rate is continuously increasing to enhance revenue generated from the state as per the block grants.	2	1.4	1	0.7	8	5.6	122	84.7	11	7.6	3.97	0.53	<0.001
The university has the necessary student support mechanisms to improve throughput rates and thereby generate more revenue from the block grants.	2	1.4	5	3.5	10	6.9	109	75.7	18	12.5	3.94	0.68	<0.001
The earmarked grants contribute adequately to the overall university development and standards for meeting targets.	1	0.7	2	1.4	15	10.4	114	79.2	12	8.3	3.93	0.55	<0.001

The mean values in Table 4.6 indicated a high level of agreement with a mean range of 3.93 to 4.09 for most of the statements. However, for one statement (The revenue generated from state subsidy is sufficient to maintain the university's financial sustainability), it indicated a significantly high level of disagreement (m = 2.89). The standard deviations were insignificant for responses at a level of 0.47 to 0.68. However, there was a significant deviation of 1.06 for the one disagreeing statement (The revenue generated from state subsidy is sufficient to maintain the financial sustainability of the university), ($p<0.001$). More respondents disagreed with the first statement than agreed. The responses thus indicate that respondents (53.5%) believe that revenue generated from state subsidies is insufficient to maintain the university's financial sustainability. However, 97.9% of respondents agreed that the university could generate more income if it increases it research output. The responses also show that the university throughput rate is continuously increasing to enhance revenue generated from the state as per block grant at an agreement level of 92.3%. The responses further confirmed that the respondents believe that the university has the necessary student support mechanism to improve its throughput rates and generate more revenue from the block grants at an agreement level of 88.2%. The responses also highlighted a significantly higher level of agreement that earmarked grants to contribute adequately to the overall university development at an agreement level of 87.5%. All the statements indicated a statistically significant spread of responses across the rating scales ($p<0.001$).

The factor analysis indicated that all the statements loaded into one component in this section ($p<0.001$).

The overall findings with regards to first stream income are:

- State subsidy is insufficient to maintain the financial sustainability of the university.
- Increasing research output would boost the university block grant funding.
- The University throughput rate is continuously increasing.

- University has necessary students support mechanism improving throughput rate, among other things increasing revenue from block grants.
- The earmarked grants are adequately contributing to the university development.

The state funding is insufficient, whereas the university embark on necessary activities to enhance it.

4.3.3.2 Second-stream income

The respondents' opinions on the statements comprising second-stream income are shown in Table 4.7.

Table 4.7: Second-stream income													
	Level of Disagreement				Neutral		Level of Agreement				Mean	Standard deviation	Chi square p-values Sig.
	Strongly Disagree		Disagree				Agree		Strongly Agree				
	n	%	n	%	n	%	n	%	n	%			
The block grant earned through research output is an important contributor to DUT's financial sustainability.	0	0.0	4	2.8	11	7.6	107	74.3	22	15.3%	4.02	0.58	<0.001
The revenue generated from tuition fees is sufficient to maintain the financial sustainability of the university.	4	2.8	60	41.7	7	4.9	64	44.4	9	6.3%	3.10	1.11	<0.001
The university always meets its enrolment targets.	0	0.0	12	8.3	17	11.8	101	71.1	14	9.7%	3.81	0.72	<0.001
The university could generate more income from tuition fees if it increases its student intake.	1	0.7	7	4.9	5	3.5	116	80.6	15	10.4%	3.95	0.63	<0.001
The annual increase of tuition fees is still an effective mode of increasing revenue from second- stream income.	0	0.0	13	9.0	9	6.3	111	77.1	11	7.6%	3.83	0.69	<0.001
The tuition fee freeze had a significant impact on the university's financial sustainability.	0	0.0	55	38.2	28	19.4	50	34.7	11	7.6%	3.12	1.01	<0.001

Table 4.7 shows that all the statements show higher levels of agreement with means of 3.81 to 4.02 except for the statements on adequacy of tuition fees to maintain the financial sustainability of the university (m =3.10) and the impact of tuition fee freeze on the university financial sustainability (m = 3.12).

The standard deviation for the statements where there was agreement were in a range of 0.58 to 0.72 and where there was disagreement ranged by 1.01 and 1.11 for the marginal levels. The significance level for all the responses in this section was $p<0.001$.

The pattern of responses indicated an agreement of 50.7% and a disagreement of 44.5% by the respondents that tuition fee contributes sufficiently to financial sustainability. The respondents agreed (80.8%) that the university always meets its enrolment targets. The respondents agreed (91%) that increasing students' enrollment would enhance the university's income. The responses also showed that an annual increment of tuition fee is still an effective mode of increasing revenue for the university with an agreement level of 84.7%. In contrast, the responses further indicated more or less a neutral response to the fee freeze contribution to the university financial sustainability with a disagreement level of 38.2%, neutral level of 19.4%, agreement level of 42.3%.

The factor analysis indicated a significant variation in responses with two loadings detected from the main factor. The detected factors were given subthemes; "financial sustainability factors" and "reflection on income freeze". This was supported by the above discussion of the respondents' pattern of responses.

The overall findings with regards to the effectiveness of second-stream income are:

- The block grant earned through research output is an important contributor to the university's financial sustainability.
- The university always meets its enrolment targets.
- The university could generate more income from tuition fees if it increases its student intake.

- The annual increase of tuition fees is still an effective mode of increasing revenue from second- stream income.

Accordingly, tuition fee is considered an important contributor to financial sustainability.

4.3.3.3 Third-stream income

The respondents' opinions on the statements comprising third-stream income and its possible impact on financial sustainability are shown in Table 4.8.

Table 4.8: Third-stream income													
	Level of Disagreement				Neutral		Level of Agreement				Mean	Standard deviation	Chi square p-values Sig.
	Strongly Disagree		Disagree				Agree		Strongly Agree				
	n	%	n	%	n	%	n	%	n	%			
The revenue generated from third-stream income is sufficient to maintain the financial sustainability of the university.	5	3.5	92	63.9	9	6.3	33	22.9	5	3.5	2.59	0.99	<0.001
University segments are offering short-courses and certificates to enhance the university's financial sustainability.	0	0.0	5	3.5	5	3.5	112	77.8	22	15.3	4.05	0.57	<0.001
The university has strategic teams working with donors to attract more funds from donor funding.	2	1.4	2	1.4	43	29.9	83	57.6	14	9.7	3.73	0.71	<0.001
The university is offering commercialised services to the external community.	1	0.7	8	5.6	22	15.3	101	70.1	12	8.3	3.80	0.70	<0.001
The university has adequate research contracts contributing to the enhancement of third-stream income.	3	2.1	34	23.5	23	16.0	67	46.5	17	11.8	3.42	1.04	<0.001
The university has investment portfolios aimed at greater returns.	0	0.0	5	3.5	11	7.6	113	78.5	15	10.4	3.96	0.57	<0.001

Table 4.8 shows that the responses indicated varying perceptions on the statements that comprised this section. All the statements indicated a statistically significant spread of responses across the rating scales ($p<0.001$). The respondents' highest disagreement level of 67.4% was that third-stream income is sufficient to measure the university's financial sustainability (m = 2.59). In essence, the respondents indicated that third-stream income is insufficient to ensure the university's financial sustainability. The respondents agreed that university segments offer short courses and certificates to enhance financial sustainability with an agreement level of 93.1% (m = 4.05). The university also offers commercialised services to attract additional funds had an agreement level of 78.4% (m = 3.80). The responses indicated that the university has strategic teams working on attracting more third-stream income from donor funding at an agreement level of 67.3% and with neutral responses of 29.9% (m = 3.73). The responses varied in agreement as to whether the university has adequate research contracts contributing to enhancement of third-stream income at an agreement level of 58.3% and proportionate spread among neutral and disagree (m = 3.42). Lastly the university has investment portfolios aimed at greater returns had an agreement level at 88.9% (m = 3.96). From these responses, it can be concluded that the university is doing its best to attract revenue from third stream income.

The factor analysis supporting the responses as outlined by Table 4.8 detected one subtheme, being "third stream income contribution to financial sustainability". This supported the statements: "The revenue generated from third-stream income is sufficient to maintain the university's financial sustainability" and "The university has adequate research contracts contributing to the enhancement of third-stream income".

The overall findings with regards to the effectiveness of third-stream income are:

- The revenue generated from third-stream income is insufficient to maintain the financial sustainability of the university.
- University segments are offering short courses and certificates to enhance university financial sustainability.

- The university has strategic teams working with donors to attract more funds from donor funding.
- The university is offering commercialised services to the external community.
- The university has adequate research contracts contributing to the enhancement of third-stream income.
- The university has investment portfolios aimed at greater returns.

The university is embarking on strategic funding sources to enhance revenue generated from third-stream income, as much as the current income generated from this revenue source is not sufficient.

The next section discusses the respondents' opinions on the revenue generation strategies at DUT which addresses the third research question.

4.3.4 Revenue generation strategies at DUT

A number of statements were posed regarding the revenue strategies of DUT. Table 4.9 shows the respondents' scoring of the statements.

Table 4.9: Revenue generation strategies													
	Level of Disagreement				Neutral		Level of Agreement				Mean	Standard deviation	Chi square p-values Sig.
	Strongly Disagree		Disagree				Agree		Strongly Agree				
	n	%	n	%	n	%	n	%	n	%			
Diversification of revenue sources is the key solution to the university's financial sustainability.	0	0.0	3	2.1	6	4.2	43	29.9	92	63.9	4.56	0.68	<0.001
Financing university through single source revenue (that is , either first, second or third-stream income) is a financially sustainable decision.	79	54.9	26	18.1	6	4.2	22	15.3	11	7.6	2.03	1.38	<0.001
The university segments can partner with industry to conduct a need analysis and identify possible short courses.	0	0.0	1	0.7	5	3.5	118	81.9	20	13.9	4.09	0.44	<0.001
The university segments are essential pillars for generating additional revenue strategies for the university.	0	0.0	4	2.8	3	2.1	122	84.7	15	10.4	4.03	0.49	<0.001
The university have necessary strategies and skills to enhance revenue from third-stream income.	0	0.0	40	27.8	22	15.3	73	50.7	9	6.3	3.35	0.96	<0.001

The university is offering commercialised research to the external community as a model of sourcing more funds for the university.	0	0.0	1	0.7	18	12.5	115	79.9	10	6.9	3.93	0.47	<0.001
The university's commercial ventures to the external community includes consultancy and professional services.	0	0.0	8	5.6	80	55.6	46	31.9	10	6.9	3.40	0.70	<0.001
Implementation of new course offerings is a contributor to the university's financial sustainability.	0	0.0	2	1.4	2	1.4	72	50.0	68	47.2	4.43	0.60	<0.001
DUT is attracting international students as a model for enhancing its revenue generation strategies.	1	0.7	3	2.1	11	7.6	117	81.3	12	8.3	3.94	0.55	<0.001
Investment in student support mechanisms is the key solution to increasing throughput rates.	1	0.7	2	1.4	6	4.2	95	66.4	39	27.3	4.18	0.64	<0.001
Expansion of infrastructure is used to increase student enrolments hence growing revenue.	0	0.0	5	3.5	5	3.5	109	76.2	24	16.8	4.06	0.58	<0.001
International collaborations can enhance the research output.	0	0.0	1	0.7	1	0.7	72	50.0	70	48.6	4.47	0.55	<0.001
Improved staff qualifications will increase research output.	0	0.0	1	0.7	1	0.7	110	76.4	32	22.2	4.20	0.47	<0.001

Table 4.9 shows mean values ranging from 2.03 to 4.56 with standard deviations ranging 0.44 to 1.38 for the statements in this section. All the statements also indicated an statistically significant spread of responses across the rating scales ($p<0.001$).

Based on the trend of the responses, the analysis was performed according to the sub-themes to make meaningful conclusions on the outcome of the statements. These sub-themes were derived from the components of the factor analysis presented in Chapter Three. Statements grouped as strategies for sourcing additional funds outlined that respondents disagreed that financing university through single-source revenue will be a financially sustainable decision (m = 2.03), and were mainly neutral to the statement that the university has the necessary strategies and skills to enhance revenue generated from third-stream income (m = 3.35). They were mostly neutral to that university commercial ventures include consultancy and professional services (m = 3.40), and lastly, indicated that improved staff qualifications enhance the research output (m = 4.20).

Statements on models of sourcing additional revenue outlined that respondents agreed to the content of statements under this sub-theme. Their pattern of responses indicated that the university is offering commercialised research to the external community (m = 3.40) and that implementation of new course offerings is a contributor to university financial sustainability (m = 4.43). The statements that DUT is attracting international students as a model for enhancing its revenue generation strategies (m = 3.94), investment in student support mechanisms is the key solution to increasing throughput rates (m = 4.18) and infrastructure expansion is used to increase students' enrolments, hence growing revenue (m = 4.06) showed support by the respondents.

The statements on recommendations to enhance revenue generation strategies outlined that the respondents indicated they strongly agreed to all the statements in this sub-theme outlining that diversification of revenue sources as the key solution to university financial sustainability (m = 4.56), university segments are an essential pillar for generating additional revenue strategies (m = 4.03) and that international collaboration is likely to enhance research output (m = 4.07). The

statement under industrial partnerships highlighted that partnering with industry will assist the university to identify possible skill gaps and could implement offerings to respond to this need (m = 4.09).

The pattern of these responses allowed possible recommendations for revenue generation strategies to ensure financial sustainability to be made, including evaluating the effectiveness of existing revenue sources and areas for improvement.

The responses also indicated the measurement variations as highlighted in the factor analysis, which indicated four sub-themes. These sub-themes were strategies for additional sourcing of funds, models of additional sourcing of revenue, recommendations for enhancing revenue generation strategies and industrial partnerships. These sub-themes perfectly measured the intention of the statements in this section.

The overall findings with regards to the third research objective were:

- Diversification of revenue sources is the key solution to the university's financial sustainability.
- Financing university through single-source revenue (that is, either first, second or third-stream income) is not a financially sustainable decision.
- The university segments can partner with the industry to conduct a needs analysis and identify possible short courses.
- The university segments are essential pillars for generating additional revenue strategies for the university.
- The university has the necessary strategies and skills to enhance revenue from third-stream income.
- The university offers commercialised research to the external community as a model of sourcing more funds for the university.
- The university's commercial ventures to the external community include consultancy and professional services.
- Implementation of new course offerings is a contributor to the university's financial sustainability.

- DUT is attracting international students as a model for enhancing its revenue generation strategies.
- Investment in student support mechanisms is the key solution to increasing throughput rates.
- Expansion of infrastructure is used to increase student enrolments, hence growing revenue.
- International collaborations can enhance the research output.
- Improved staff qualifications will increase research output.

The strategies for sourcing revenue have been discussed and the respondents deemed them fit to enhance revenue sourcing in the university and ensure financial sustainability. In evaluating each income stream, it was found that the university is practising some strategies to increase their revenue sourcing. Incorporating the strategies supported by the respondents could ensure the financial sustainability of the university.

4.4 Income streams and sub-groups of the respondents

Before addressing the final research question of this study, a Mann Whitney U test was performed to identify whether the staff members in management positions had different opinions on the statements in the questionnaire used for the first three research objectives when compared to the academic staff. Management of the university are more concerned with financial matters, whereas academic staff are more concerned with teaching and learning. These two sub-groups may have different ideas on how the financial sustainability of DUT may be affected by the various challenges present in South African higher education. These results are shown in Table 4.10

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Table 4.10: Comparative analysis on level of scoring, management against academics											
	Management/Support Staff			**Academics**			**Total**			**Mann-Whitney U test**	
	n	Mean	Standard deviation	n	Mean	Standard deviation	n	Mean	Standard deviation	Z-scores	p-values
Revenue sourcing is a financial challenge for the university.	75	3.89	0.58	69	3.38	0.91	144	3.65	0.80	-3.978	0.001**
The knowledge and skills of university management are the barriers to university revenue generation strategies.	75	3.12	1.22	69	3.12	1.21	144	3.12	1.21	-0.084	0.933
The university post-graduate students complete their degrees within the minimum timeframe which enhances research output.	75	2.65	0.94	69	3.52	1.01	144	3.07	1.06	-4.929	0.001**
The revenue generated from state subsidy is sufficient to maintain the financial sustainability of the university.	75	2.71	0.97	69	3.09	1.12	144	4.09	0.47	-2.159	0.468
The university's throughput rate is continuously increasing to enhance revenue generated from the state as per the block grants.	75	3.95	0.46	69	3.99	0.61	144	3.97	0.53	-0.841	0.401
The earmarked grants contribute adequately to the overall university	75	3.95	0.43	69	3.91	0.66	144	3.93	0.53	-0.096	0.924

development and standards for meeting targets.											
The revenue generated from tuition fees is sufficient to maintain the financial sustainability of the university.	75	2.75	1.05	69	3.48	1.04	144	3.10	1.11	-3.974	0.001**
The university always meets its enrolment targets.	75	3.81	0.69	69	3.81	0.75	144	3.81	0.72	-0.027	0.978
The annual increase of tuition fees is still an effective mode of increasing revenue from second- stream income.	75	3.81	0.65	69	3.86	0.73	144	3.83	0.69	-0.443	0.658
The revenue generated from third-stream income is sufficient to maintain the financial sustainability of the university.	75	2.52	0.92	69	2.67	1.07	144	2.59	0.99	-0.788	0.431
The university has strategic teams working with donors to attract more funds from donor funding.	75	3.76	0.52	69	3.70	0.88	144	3.73	0.71	-0.272	0.786
The university has investment portfolios aimed at greater returns.	75	4.00	0.40	69	3.91	0.70	144	3.96	0.57	-0.855	0.392
Diversification of revenue sources is the key solution to the university's financial sustainability.	75	4.65	0.67	69	4.45	0.68	144	4.56	0.68	-2.336	0.020*
Financing university through single source revenue (that is, either first, second or third-stream income) is a financially sustainable decision.	75	1.65	1.22	69	2.43	1.43	144	2.03	1.38	-4.165	0.001**

The university segments are essential pillars for generating additional revenue strategies for the university.	75	4.08	0.32	69	3.97	0.62	144	4.03	0.49	-0.749	0.454
The university is offering commercialised research to the external community as a model of sourcing more funds for the university.	75	3.92	0.36	69	3.94	0.57	144	3.93	0.47	-0.398	0.691
Implementation of new course offerings is a contributor to the university's financial sustainability.	75	4.56	0.50	69	4.29	0.67	144	4.43	0.60	-2.461	0.014*
DUT is attracting international students as a model for enhancing its revenue generation strategies.	75	4.01	0.42	69	3.87	0.66	144	3.94	0.55	-1.391	0.164
International collaborations can enhance the research output.	75	4.60	0.52	69	4.32	0.56	144	4.47	0.55	-3.117	0.002**
Improved staff qualifications will increase research output.	75	4.20	0.40	69	4.20	0.53	144	4.20	0.47	-0.326	0.745

Note:
1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, 5 = strongly agree
n = number (s)
management/support staff = executive management, department heads, and finance officers; academics = academic lecturers
**significant <0.01 level
*significant <0.05 level

Table 4.10 shows that the two sub-samples had similar opinions on most of the statements as the difference in the means, measured by using the Mann-Whitney U test, did not show any statistically significant differences. However, the following statements showed a statistically significant difference in the scoring of the two sub-samples. While both academics and management agreed that revenue sourcing is a financial challenge for the university, with means of 3.38 and 3.89 respectively, the academics were more neutral in their opinions and this difference is statistically significant at $p<0.01$. A possible reason for this is that academics are more focused on teaching and learning and might have limited information about the university's financial sustainability. Management has better knowledge of the university's financial sustainability as their line of work is related to the topic, hence their response was more agree than neutral ($m = 3.89$).

The opinions of management and academic differed on whether post-graduate complete their qualifications within the minimum time frame to enhance research output as management's mean was 2.65, whereas the academics' mean was 3.52 ($p<0.01$). Although the mean score for academics is near to neutral, some may have agreed with this statement as the students they have supervised did complete within minimum timeframe. On the other hand, the post-graduate completion rate is reflected in university funding, hence management may have indicated disagree as they have better information on the overall performance of post-graduates.

The opinions of management and academics also differed because revenue generated from tuition fees is sufficient to maintain the university's financial sustainability ($p<0.01$). A possible reason for this is that management are better informed on income sources, hence they disagreed with this statement ($m = 2.75$), whereas academics might be less informed, hence most of their responses were neutral to agree ($m = 3.48$). An explanation for the slight differences in their perceptions on the selected statements is that management and support staff have more practical experience in the variables underpinning this study, whereas academics relied on their theoretical knowledge and observations.

The was a strong agreement among management and academic staff on the statement that diversification of revenue sources is a key solution to the university's financial sustainability at a with means 4.65 and 4.45 respectively ($p<0.01$). The

statement on implementing new course offerings contributes to the university's financial sustainability, which means 4.56 and 4.29 ($p<0.01$). Lastly, the statement on international collaborations can enhance the research output was also supported with means of 4.60 and 4.32 ($p<0.01$). A possible reason for these agreement levels is that both management and academics are knowledgeable on the performance of revenue sources and the strategies thereto.

However, management and academics disagreed with the statement on financing university through single source revenue (that is, either first-stream income, second-stream income and third-stream income) is a financially sustainable decision with means of 1.65 and 2.43 respectively ($p<0.01$). This concludes the analysis of the data addressing the first three research questions.

To answer the final research objective, which was evaluating the effectiveness of existing revenue streams at in the financing of DUT, first a correlation matrix was calculated and after a structural equation modelling was used to examine whether there is a structural relationship between the measured variables and the latent constructs. This was used to test the hypotheses established by conceptual model presented in Chapter Two.

4.5 Effectiveness of existing revenue streams at DUT

4.5.1 Correlation matrix

The correlation matrix indicates the relationship between the variables underpinning this research. The relationship between variables is outlined by the correlation coefficient, supported by the Sig. (2 Tailed).

Table 4.11: Correlation matrix								
		Knowledge of revenue sources	Knowledge of financial sustainability	Revenue sourcing is a financial challenge for the university	First-stream income contributes to financial sustainability	Second-stream income contributes to financial sustainability	Third-stream income is sufficient to maintain financial sustainability	Diversification of revenue sources is the key to ensure financial sustainability
Knowledge of revenue sources	Corr.	1						
	Sig.							
Knowledge of financial sustainability	Corr.	0.901	1					
	Sig.	0.000**						
Revenue sourcing is a financial challenge for the university	Corr.	0.255	0.268	1				
	Sig.	0.002**	0.001**					
First-stream income contributes to financial sustainability	Corr.	0.059	0.013	-0.284	1			
	Sig.	0.483	0.877	0.001**				
Second-stream income contributes to financial sustainability	Corr.	0.063	0.015	-0.348	0.574	1		
	Sig.	0.452	0.857	0.000**	0.000**			
The revenue generated from third-stream income is sufficient to maintain financial sustainability	Corr.	0.135	0.076	-0.121	0.486	0.489	1	
	Sig.	0.106	0.363	0.149	0.000**	0.000**		
Diversification of revenue sources is the key to ensure financial sustainability of the university.	Corr.	0.097	0.130	0.086	-0.116	0.146	-0.346	1
	Sig.	0.249	0.122	0.303	0.167	0.080	0.001**	
Note: **significant < 0.01 level *significant <0.05 level								

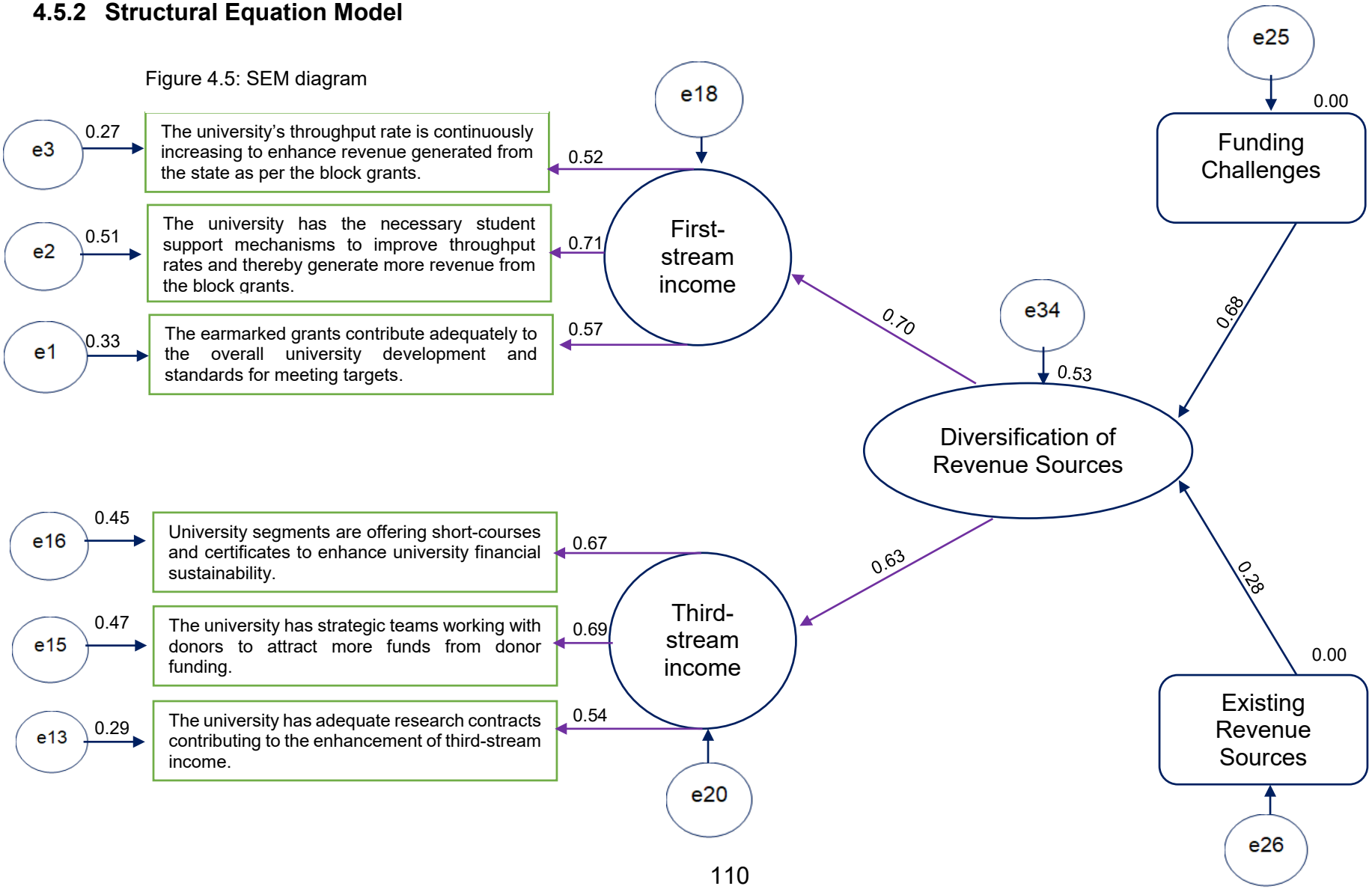
Table 4.11 shows a statistically significant positive correlation between the staff knowledge of revenue sources and the knowledge of financial sustainability ($r = 0.901$) at $p<0.01$. There is a low positive correlation among the variables on revenue sourcing as a financial challenge for the university ($r = 0.268$) and the knowledge of revenue sourcing ($r = .0255$) and financial sustainability at $p < 0.05$.

A negative correlation is noted among statements on each income stream's contribution to revenue sourcing; however, the correlation is significant only for first- ($r = -0.284$, $p<0.05$) and second-stream income ($r = -0.348$, $p<0.01$). There was a significantly positive correlation between the income streams (first to second at $r = 0.574$; first to third at $r = .0486$; second to third at $r = .0489$) (all at $p<0.001$). Lastly, there was a significantly negative correlation on diversification of revenue sources and the contribution of third-stream income to financial sustainability ($r = -0.346$, $p<.001$).

The next section addresses the hypotheses which were established using the conceptual model discussed in Chapter Two.

4.5.2 Structural Equation Model

Figure 4.5: SEM diagram



The path diagram for the modified SEM is shown above.

The structural relationship results were obtained using a multivariate statistical model to integrate the multiple regression analysis and the factor analysis techniques. The structural relationship were examined across the measured variable and latent constructs.

4.5.2.1 Result (default model)

The null hypothesis is that the over identified (reduced) model fits the data as well as a fully identified (full, saturated) model. Each variable in a just-identified model directly connects (not through an intervening variable) to the other variable. The chi-square will always be zero in such a model because the fit will always be perfect. The probability should not be significant. The chi-square, in this model was calculated at 21.824 with a p-value = 0.240 (and degrees of freedom = 18). This meets the criteria for the model.

4.5.2.2 Maximum likelihood estimates

The maximum likelihood estimates were then calculated. These are shown on Table 4.12.

Table 4.12: Likelihood estimates

	Estimates	S.E.	C.R.	P	Label
Diversification ← The university have necessary strategies and skills to enhance revenue from third-stream income	0.063	0.027	2.321	0.020	par_6
Diversification ← The university staff have adequate knowledge to generate additional strategies for revenue sourcing	0.184	0.045	4.096	***	par_7
First-stream income ← Diversification	1.000				
Third-stream income ← Diversification	1.099	0.342	3.210	0.001	par_5
The earmarked grants contribute adequately to the overall university development and standards for meeting targets ← First-stream income	1.000				

The university has the necessary student support mechanisms to improve throughput rates and thereby generate more revenue from the block grants ← First-stream income	1.532	-0.332	4.611	***	par_1
The university's throughput rate is continuously increasing to enhance revenue generated from the state as per the block grants ← First-stream income	0.879	-0.209	4.212	***	par_2
The university has adequate research contracts contributing to the enhancement of third-stream income ← Third-stream income	1.473	-0.315	4.673	***	par_3
The university has strategic teams working with donors to attract more funds from donor funding ← Third-stream income	1.273	-0.250	5.085	***	par_4
University segments are offering short-courses and certificates to enhance university financial sustainability ← Third-stream income	1.000				
Notes: ***p<0.001 Regression weights: (group number 1 – default model)					

The variables loaded strongly along their various factors ($p < 0.001$). These verify the results obtained under the factor analysis. However, Funding Challenges and Existing Revenue were reduced to a single variable as the other variables loaded poorly.

Table 4.13 shows the standardised regression estimates for Group number 1, the default model.

Table 4.13: Standardised regression estimates

	Estimates
Diversification ← The university have necessary strategies and skills to enhance revenue from third-stream income	0.277
Diversification ← The university staff have adequate knowledge to generate additional strategies for revenue sourcing	0.676
First-stream income ← Diversification	0.697

Third-stream income ← Diversification	0.630
The earmarked grants contribute adequately to the overall university development and standards for meeting targets ← First-stream income	0.572
The university has the necessary student support mechanisms to improve throughput rates and thereby generate more revenue from the block grants ← First-stream income	0.714
The university's throughput rate is continuously increasing to enhance revenue generated from the state as per the block grants ← First-stream income	0.518
The university has adequate research contracts contributing to the enhancement of third-stream income ← Third-stream income	0.541
The university has strategic teams working with donors to attract more funds from donor funding ← Third-stream income	0.686
University segments are offering short-courses and certificates to enhance university financial sustainability ← Third-stream income	0.671
Note: Standardised Regression Weights: (Group number 1 - Default model)	

The parameters are calculated using the maximum likelihood approach, an iterative approach that aims to maximize the possibility that the criterion variable's values will be properly predicted. Some of the coefficients were above the suggested value of 0.700, whilst others were slightly lower. Variable B11.5 was retained even though the weight was low as the fit indices were all high.

4.5.2.3 Model fit summary

CMIN is a Chi-square statistic that compares the saturated model to the tested model and the independence model. The relative chi-square ratio, CMIN/DF, is a measure of how much the fit of data to model has been reduced due to eliminating one or more routes.

CMIN/DF, the indicated acceptable value for relative chi-square, should not be more than five, as this lowers sample size reliance. TLI, CFI, NFI, and IFI, on the other hand, have cut-off points ranging from zero to one. An RMSEA score of less than or equal to 0.05 indicates a good model.

Table 4.14: CMIN

Model	**NPAR**	**CMIN**	**DF**	**P**	**CMIN/DF**
Default model	26	21.824	18	0.240	1.212
Saturated model	44	0.000	0		
Independence model	16	197.860	28	.000	7.066

As shown by Table 4.14 the CMIN/DF is less than the acceptable value of 5 (1.212). This meets the CMIN condition. The next step was to compute the goodness of fit indices. Instead of comparing the model to the saturated model, these goodness of fit indices compare it to the independence model. The difference between the two models' chi-squares divided by the chi-square for the independence model yields the Normed Fit Index (NFI). This result is shown in Table 4.15.

Table 4.15: Baseline comparisons

Model	NFI Delta1	RFI rho1	IFI Delta2	TLI rho2	CFI
Default model	0.890	0.828	0.979	0.965	0.977
Saturated model	1.000		1.000		1.000
Independence model	0.000	0.000	0.000	0.000	0.000

The NFI for this data is 0.890, which is somewhat less than the suggested value of 0.9 for a good fit. The Comparative Fit Index (CFI) is an excellent index to use even with tiny samples because it utilizes a similar technique (with a noncentral chi-square). Like the NFI, it goes from 0 to 1, with 0.90 indicating an excellent fit. 0.977 is the CFI value.

The next step was to calculate parsimony-adjusted measures. These are shown in Table 4.16.

Table 4.16: Parsimony-adjusted measures

Model	PRATIO	PNFI	PCFI
Default model	0.643	0.572	0.628
Saturated model	0.000	0.000	0.000
Independence model	1.000	0.000	0.000

The ratio of how many pathways are dropped versus how many could have been dropped is PRATIO (all of them). The product of NFI and PRATIO is the Parsimony Normed Fit Index (PNFI), while the product of CFI and PRATIO is the Parsimony Normed Fit Index (PCFI). The PNFI and PCFI are meant to recognize people who create cost-effective models (contain few paths). A value of more than 0.900 is regarded as satisfactory. This model has a value less than the

recommended (0.643). Finally, the root mean square error of approximation (RMSEA) was calculated.

The RMSEA estimates lack of fit to the saturated model. This result is shown in Table 4.17.

Table 4.17: RMSEA

Model	RMSEA	LO 90	HI 90	PCLOSE
Default model	0.039	0.000	0.088	0.595
Independence model	0.206	0.179	0.233	0.000

A RMSEA of less than 0.05 suggests a good fit, while between 0.05 and 0.08 indicates a satisfactory fit. The bottom and upper limits of a 90 percent confidence interval on this estimate are LO 90 and HI 90. Despite the fact that the model is acceptable, the PCLOSE p value (p = 0.595) that tests the null that RMSEA is less than 0.05 is not significant. The value of the RMSEA is 0.039.

To summarise, only the PRATIO index did not meet the required cut-off value.

A few statements that loaded poorly were eliminated from the model. High factor loadings were discovered when the coefficients for each latent variable were examined. The path coefficients are also depicted on the graphic. All of the coefficients are high, showing that the latent variables have strong positive connections.

The outcome of the SEM highlighted the relationship of the factors of this research. Accordingly, the results outline that relatively first-stream income and third-stream income are important contributors to the diversified revenue structure. However, second-stream income was highlighted as an independent factor. The results further outline that the university financing model currently being used is a diversified revenue structure, mostly comprised of revenue from first-stream income and third-stream income.

The results further outline that funding challenges arise from the diversified revenue structure due to shortage of third-stream income and first stream income.

The results of the hypotheses testing using SEM are shown in Table 4.18.

Table 4.18: Hypothetical response to the conceptual framework

First-stream income	≠≈	Financial sustainability
Second-stream income	≠≈	Financial sustainability
Third-stream income	≠≈	Financial sustainability
Diversification	=	Financial sustainability

Note:
= Equivalent, ≠ Not equal to and ≈ Approximately

H1 (first-stream income), H2 (Second-stream income), and H3 (third-stream income) were predicted to have a positive impact on the financial sustainability of DUT. The results of the SEM analysis cause these hypotheses to be rejected; instead, they are important contributors to financial sustainability, although second-stream income was identified as an independent factor.

H4, that predicted diversification of revenue sources to impact the financial sustainability of DUT was accepted.

To ensure financial sustainability, revenue sources must be sufficient for the university to carry on its business. The overall results support the recommendation that diversification of revenue sources is the way to ensure financial sustainability. The university still needs to improve on every single source of revenue (first-, second- and third-income streams) to ensure its financial sustainability.

Financial sustainability relies on adequate revenue sources, and all revenue sources contribute to financial sustainability. Independently, these revenue streams may not support financial sustainability, but they support financial sustainability when combined. Hence the results presented in Table 4.18, support

diversification of these revenue streams as a way to contribute to financial sustainability.

4.6 Analysis of open-ended questions

Out of the total of 144 respondents, only three respondents answered the open-ended questions.

4.6.1 Additional comments on revenue challenges facing the university

"*Management must practice skill of generating income for the university*".

"*Change in the Management level is urgently required*".

Respondents identified management skills as a challenge in generating income for the university and recommended a change in the management levels.

4.6.2 Additional comments on revenue generation strategies for the university

"*University must engage in research activities that can attract funding and must also try to source international students as well*".

"*University needs to inspire departments and its employees to be contributors to third income stream sourcing without jeopardising its core business*".

"*As much as DUT seems sustainable in my opinion, but attracting income through commercialised services to the industry as part of enhancing third stream income has been less practiced. Which in my opinion could assist the university to generate more income from this income source*."

"*The university needs to develop strategies that will help actualise revenue collection, particularly tuition fee, to ensure its financial sustainability*".

Respondents suggested that the university needed to engage in research activities to attract funds, increase international students' enrolments, and inspire segments and its employees to contribute to third-stream income sourcing without jeopardising its core business. They further suggested that industrial partnerships could assist the university to enhance its revenue sourcing. Lastly,

the respondents suggested that the university develop strategies to enhance revenue collection from tuition fees to ensure financial sustainability.

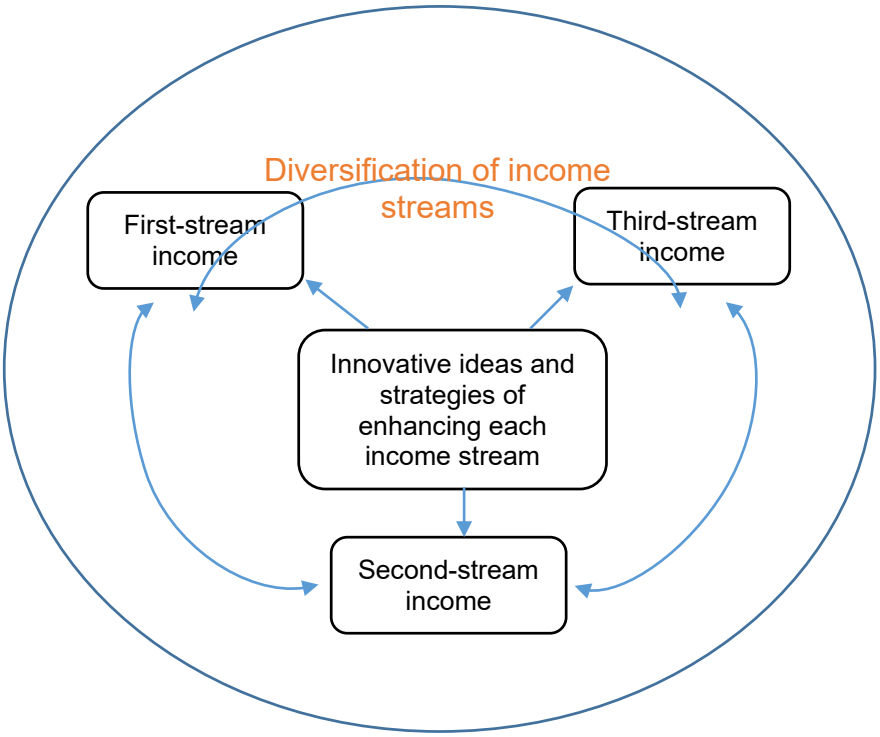
4.7 Research results compared to literature

This research supports the findings of Almagtome *et al.* (2019) that university management's knowledge and skills are paramount contributors to a financially sustainable institution. The findings further indicated that international students' enrolments are important contributors to enhanced revenue generation strategies supporting Saudi (2019). Panigrahi (2018), in a study exploring financing of a university in India, indicated that universities in India are still highly reliant on government funding, which is supported by the findings of this research of the important contribution of government grants to funding South African universities. Similarly, in the continual sourcing of alternative revenue, the universities in India are still struggling to find alternative sources of revenue (Panigrahi 2018), whereas the findings of this research indicated that the universities are exploring best possible strategies to enhance their revenue sources.

The findings further indicated that diversification of income sources is the solution to the financial strains in the university sector, supporting Ekpoh and Okpa (2017). The respondents recommended offering services such as consultancy, commercial ventures, and other qualifications in this study, which supports the findings of Ekpoh and Okpa (2017); Bansi (2019). According to Crowther *et al.* (2018), university segments are important enablers for the university to enhance its revenue, supporting the results of this study that the university segments were perceived to be important contributors to the university's financial sustainability. Swartz *et al.* (2019) indicated that partnerships with industry could assist universities to generate additional revenue, a recommendation also made by the respondents of this research.

A pictorial depiction of the financial sustainability model to promote university financing is shown below:

Figure 4.6: Financial sustainability model in university financing



4.8 Summary

The interpretation of the data was presented and discussed in this chapter. Regarding the first research question, the main finding was that the university has a financial challenge, however, the financial challenge does not arise due to shortage of knowledge, skills, experience, resources and infrastructure. The low state block grant is among the factors that imposes a financial challenge to the university. In evaluating each income stream, the main findings were firstly, the state funding is insufficient, indicating a need for the university to embark on activities to enhance it. Secondly, tuition fees make a favourable contribution to the financial sustainability of DUT. Lastly, the university is embarking on strategic funding sources to enhance revenue generated from third-stream income, as the current income generated from this revenue source is insufficient. With regards to the final research question, using SEM analysis, the study found that the diversification of revenue sources has a positive effect on the financial sustainability of DUT. The next chapter provides the conclusions and recommendations of the study.

CHAPTER FIVE

CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

The preceding chapter discussed the outcomes from the measuring instruments of this research. This chapter provides the conclusions resulting from this study. Recommendations are also made in this chapter, together with the limitations of the study and suggestions for further research.

5.2 Overview of the study

Universities have been burdened financially in recent decades due to decreasing state subsidies and the high amount of student debts. Numerous approaches have been practiced to ensure universities' financial sustainability, but inclusivity of enrolments had also to be maintained. This has increased the number of student enrolments in universities. In South Africa, most communities were previously disadvantaged. Some are still disadvantaged; this has meant that although some studying opportunities have also been afforded to students who cannot afford the universities' tuition fees, the public funding through NSFAS is not sufficient reach out to all disadvantaged communities. Though these enrolments have increased, so has students' debts as a result of their failure to meet some of their obligations to tuition fees. However, universities have been entrusted to offer quality education to the population. This caused a financial crisis for universities as they have limited resources leading them to increase their focus on third-stream income. Since tuition fees collection is erratic and state support grants are insufficient, universities have prioritised third-stream income to address the revenue gap.

Using this background, this research aimed to investigate revenue generation strategies to ensure the financial sustainability of DUT.

The research aim was supported by the objectives outlined below:

1. What are the challenges faced by DUT in funding?

2. How does each income stream affect the financial sustainability of DUT?
3. What are suitable revenue generation strategies for public universities in KwaZulu-Natal?
4. How effective are the existing revenue sources in the financing of DUT?

The context of the research background was used to identify the research problem. The literature review added value to the study by examining various theories relevant to this research provided the context of university funding and DUT, and practices around university financing, together with recommendations in and outside Africa.

The study used a questionnaire as the measuring instrument to provide the data to answer the research questions posed in this study.

The next section presents the results of the study drawing from the objectives of this research.

5.3 Results of the study

The following section presents the results from the empirical investigation reported in this study.

5.3.1 DUT's funding challenges

The study first investigated the funding challenges of the university. Factors affecting financial sustainability and challenges to the funding strategies of the university were discussed. Revenue sourcing, low research output, management's skills and knowledge, and the postgraduate completion rate were identified as the main factors affecting DUT's funding.

The study next evaluated each income source to enhance the discussion on hindrance or improvement in the university's revenue sourcing.

5.3.2 The effectiveness of income streams as a reliable source of financial sustainability at DUT

Each revenue stream (first-stream income, second-stream income, and third-stream income) was separately evaluated.

The respondents agreed that increasing research output could assist the university to generate more income from block grants (first-stream income). They also indicated that the university throughput rate is rapidly increasing attracting more income from block grants. Furthermore, they indicated that the university has a student support mechanism to improve the throughput rate and increase income per block grants. Lastly, the contribution of earmarked grants contributes adequately to the overall university development and standards for meeting targets. Whereas they only had marginal perception as near equal if revenue from state subsidy is sufficient to ensure financial sustainability of the university.

Further to the respondents' perspectives on first-stream income, the results on second-stream income indicated that respondents agreed with most of the statements. These were the statements that the university always meets its enrolment targets, the annual increase of tuition fees is still an effective mode of increasing revenue and increasing students' intake could assist the university to generate more income from tuition. Their perceptions were neutral on whether the revenue generated from tuition fees is sufficient to maintain financial sustainability of the university, and they could not agree on the impact of tuition fee freeze on the university's financial sustainability.

The result on third-stream income indicated unique response patterns among all factors presented. These were that the revenue generated from third-stream income is not sufficient to maintain the financial sustainability of the university, the university segments offer short courses and certificates, the university has a strategic team attracting donor funding, the university has adequate research contracts, and the university has investment portfolios aimed at greater returns.

According to the sub-samples of management or support staff and academics, the respondents' perceptions indicated that management and support staff on aggregate, disagreed about the current contribution of first-stream income and second-stream income to maintain the university's financial sustainability. With this, the sub-samples have varying knowledge, experience, and exposure to the concepts being explored in this research. Academics are considered less informed on university funding issues, whereas management and support staff could be considered better informed. However, the consensus opinion is that

these three revenue streams are valid contributors to financial sustainability; however, they are not sufficient to ensure financial sustainability.

Overall, drawing from the respondents' responses on revenue sources, it can be concluded that none of the revenue sources is sufficient to maintain the university's financial sustainability, although the university is doing its best to increase its revenue.

5.3.3 Revenue generation strategies to ensure the financial sustainability of public universities in KwaZulu-Natal

This third objective supported the intention of this research which was to recommend revenue generation strategies to ensure the financial sustainability of DUT. The exploration of strategies and driving sources to revenue generation was presented in detail in the analysis in Chapter 4.

The results indicated that improvements were needed in the strategies used to source third-stream income, including industry partnerships, encouraging university segments to engage in additional activities using their skills, and improving commercialised services offered to external communities. Further recommendations included implementing new course offerings, attracting international students, expanding infrastructural investments, international collaborations and improving staff qualifications. As per the results, a recommendation is to diversify revenue sources rather than relying on a single source.

5.3.4 The effectiveness of existing revenue streams at DUT

The final objective was to evaluate the effectiveness of existing revenue streams at DUT. The hypotheses testing indicated that none of these revenue streams can ensure financial sustainability in their own and that diversification of these revenue streams is a possible solution to ensure financial sustainability.

The results presented in this research revealed that the three streams of revenue, that is first-stream income, second-stream income, and third-stream income. have differing contributions to financial sustainability. As much as all of them are

important to the university to ensure its financial sustainability, however independently they are not enough to ensure financial sustainability.

5.4 Recommendations

The following recommendations are based on the research results.

This study recommends that management focus its attention on strategies that will enhance revenue for the university. University management have to utilise their segments to derive more strategies to generate income for the university. While deriving strategies for enhancing revenue for the university, management must ensure they do not neglect any other revenue streams and other university functions by focusing on only one stream. The university must utilise the knowledge and skills of its experienced staff to be drivers of revenue sourcing. Improvement is highly possible in attracting additional funding from third-stream income using the already existing university resources such as university segments, university resources, staff knowledge and staff experience. The university must also focus on promoting undergraduate and post-graduate students to complete on time and also motivate post-graduate students to be active in research and staff members to improve their qualifications. These factors would ensure that the university also enhances revenue from state subsidies and tuition fees, respectively. The correlations in Chapter 4 indicated no direct relationship among the three income streams, however, their contributions were vital for financial sustainability. The adoption of these recommendations must be balanced with the ordinary business of the university.

The next section discusses limitations that were encountered in this research.

5.5 Limitations of the research

Limitations in research are explained as features of the methodology that affect or influence the findings on the research objectives (Theofanidis and Fountouki 2019). Using a questionnaire is possibly a limitation to the study as the respondents may have misunderstood the questions. Different words could be interpreted differently by the respondents. This was limited by providing definitions of keywords and testing the questionnaire multiple times. The Letter

of Information provided the telephone numbers of the researcher and the supervisor which would have allowed the respondents to make contact should there have been any queries regarding the questionnaire.

The regulations imposed by Covid-19 pandemic limited the extent of communication particularly with the respondents and administrators for data for the study. However, this was mitigated to a certain extent by using telephone calls and personal emails to increase the number of completed questionnaires.

The study was based at only one university, and therefore the results may not be generalisable to other universities.

The section that follows provides recommendations for future research.

5.6 Further research

The research provided a detailed analysis of revenue sources and financial sustainability using the respondents' opinions, DUT employees, management, HoD's, finance officers, and academic lecturers. The study represents opinions at a point in time. Further research could consider longitudinal research so to provide comparable information on the research subject. Since this case study research was solely based at DUT, the findings could not be generalised to other institutions across the country. However, future research could be conducted using a similar study in a countrywide perspective.

Similarly, research could cover comparisons of South African research to that of other countries. The research only focused on exploring revenue sources and financial sustainability. Future research could explore the relationships of revenue, expenditures, and the surplus positions of universities as factors of financial sustainability. Future research could also be based solely on a trend analysis of annual financial statements.

5.7 Summary

The aim of this research was to investigate revenue generation strategies to ensure the financial sustainability of DUT. Funding challenges and the contribution of the different income streams towards financial sustainability was

discussed. This study found that financial sustainability is a challenge for the university and discussed factors underpinning the financial challenges. The results highlighted that financial sustainability depends on the sufficient availability of revenue sources. Recommendations drawing from the findings were presented. The primary finding was that revenue sourcing is the main contributor to financial sustainability.

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Appendix A

LETTER OF INFORMATION

Title of the Research Study: Exploration of revenue sources for financial sustainability of a public university in KwaZulu-Natal: A case study of Durban University of Technology.

Principal Investigator/s/researcher: Mr Ngcobo Xolani Minenhle N. Dip: CMA, BTech: CMA

Co-Investigator/s/supervisor/s: Dr Marimuthu Ferina, PhD: Finance and Prof Lesley J. Stainbank, DCom.

Brief Introduction and Purpose of the Study:

Good day Sir/Madam

I am a first year Master of Accounting student, specializing in Management Accounting at Durban University of Technology. My student number is 21405764.

I would like to invite you to partake in the research.

Research is a systematic search or enquiry for generalized new knowledge.

Outline of the Procedures:
The aim of this research is to explore available revenue sources and recommend possible revenue generation strategies that will ensure financial sustainability of a public university in KwaZulu-Natal, South Africa: The Durban University of Technology (DUT). With objective to evaluate effectiveness on existing revenue streams at DUT, investigate DUT's funding challenges, to evaluate effectiveness of each income stream as a reliable source of financial sustainability at DUT and to recommend possible revenue generation strategies. Towards fulfilling the aim of this research you are asked to participate in this research by filling the quantitative research questionnaire. The questionnaire consists of 18 question block, with 6 question of multiple bank, and two open ended questions. To be invited to this study the researcher will send you an invitation email, after your response an online consent will be sent, after which the questionnaire will follow. Follow-up will be through emails, telephonic or MS teams calls and in person where possible to do so. This research projected collection period of up-to 15 November 2020 and approximately participants 220 participants to be involved in this study.

Risks or Discomforts to the Participant: There is no potential risk that the study poses to the participant.

Explain to the participant the reasons he/she may be withdraw from the Study: There will be no adverse consequences for participant should they choose to withdraw.

Benefits: It is envisaged that at least one paper will be published in an accredited journal, that will be the main benefit associated with the study.

Remuneration: There will be no remuneration towards participating in this study.

Costs of the Study: There are no related costs expected to be covered by participant towards the study.

Confidentiality: Anonymity and confidentiality of participant will be maintained. No identification, names or further particulars of individual will be required. The questionnaire will be completely anonymous.

Results: The result of this research will be available with full thesis in the DUT library.

Research-related Injury: The research poses no adverse reaction or injury to participant.
Storage of all electronic and hard copies including tape recordings: After the data to this research has been collected, through an online questionnaire, they will be securely stored in an encrypted software, where only the researcher has access to them and the data will be stored for the duration of 5 years, after which they will be securely destroyed.

Persons to contact in the Event of Any Problems or Queries: (Dr F. Marimuthu, ferinas@dut4life.ac.za or Prof L.J. Stainbank, LesleyS@dut.ac.za) Please contact the researcher (079 137 3604), my supervisor (031 373 5646/5836) or the Institutional Research Ethics Administrator on 031 373 2375. Complaints can be reported to the Director: Research and Postgraduate Support Dr L Linganiso on 031 373 2577 or researchdirector@dut.ac.za.

CONSENT

Full Title of the Study: Exploration of revenue sources for financial sustainability of a public university in KwaZulu-Natal: A case study of Durban University of Technology.

Names of Researcher/s: Mr Ngcobo Xolani Minenhle

Statement of Agreement to Participate in the Research Study:

- I hereby confirm that I have been informed by the researcher, Xolani M. Ngcobo, (name of researcher) about the nature, conduct, benefits and risks of this study - Research Ethics Clearance Number: _____,
- I have also received, read and understood the above written information (Participant Letter of Information) regarding the study.
- I am aware that the results of the study, including personal details regarding my sex, age, date of birth, initials and diagnosis will be anonymously processed into a study report.
- In view of the requirements of research, I agree that the data collected during this study can be processed in a computerised system by the researcher.
- I may, at any stage, without prejudice, withdraw my consent and participation in the study.
- I have had sufficient opportunity to ask questions and (of my own free will) declare myself prepared to participate in the study.
- I understand that significant new findings developed during the course of this research which may relate to my participation will be made available to me.

Full Name of Participant	**Date**	**Time**	**Signature / Right Thumbprint**

I, Xolani M. Ngcobo herewith confirm that the above participant has been fully informed about the nature, conduct and risks of the above study.

Xolani Minenhle Ngcobo	22 September 2020	
Full Name of Researcher	**Date**	**Signature**
Full Name of Witness (If applicable)	**Date**	**Signature**
Full Name of Legal Guardian (If applicable)	**Date**	**Signature**

Appendix B

Faculty Research Office
Durban University of Technology
Date Sept 22, 2020

Student Xolani Minenhle Ngcobo
Student Number: 21405764
Degree: Master of Accounting (Management Accounting)
Email: 21405764@dut4life.ac.za

Dear Mr Ngcobo

ETHICAL APPROVAL: LEVEL 2
Your email correspondence in respect of the above refers.
Your proposal titled, "***Exploration of revenue sources for financial sustainability of a public university in KwaZulu-Natal: A case study of Durban University of Technology.***", has been reviewed.

I am pleased to inform you that your proposal has been granted provisional ethics approval.

When ethics approval is granted:
You are required to present the letter at your research site(s) for permission to gather data. Please also note that your research instruments must be accompanied by the letter of information and the letter of consent for each participant, as per your research proposal.

This ethics clearance is valid from the date of provisional approval on this letter for one year A student must apply for recertification 3 months before the date of this expiry.
Recertification is required every year until after corrections are made, after examination, and the thesis is submitted to the Faculty Registrar.

A summary of your key research findings must be submitted to the FRC on completion of your studies.

Kindest regards.

Yours sincerely

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Appendix C

Questionnaire towards qualification in Master of Accounting (Management Accounting)

Researcher: Mr Xolani M. Ngcobo (079 137 3604); 21405764@dut4life.ac.za.

Supervisor: Dr Ferina Marimuthu (031 373 5646); ferinas@dut.ac.za.

Co-supervisor: Prof Lesley J. Stainbank (031 373 5836); LesleyS@dut.ac.za.

The purpose of this research is to explore the available revenue sources and recommend possible revenue generation strategies that will ensure financial sustainability of a public university in KwaZulu-Natal, South Africa: the Durban University of Technology (DUT).

DEFINITION OF TERMS AND CONCEPTS

Financial Sustainability: - Refers to the state of profitability and foreseeable financial strength of the institution/entity in the long-run.

Revenue: - Any income generated by the university in any of the activities it undertakes and are categorised as first, second and third-stream income.

First-stream income: - Any income/grants generated by the university from the state (government) including any form of financial support offered by the state to the university.

Second-stream income: - Any income generated from tuition fees of the university.

Third-stream income: - Any other form of income generated by the university from any other form other than the first-stream income and second-stream income, that is, any income derived from services of the university, investments, donors and others.

University segments: - The university segments refer to the divisions of the university, that is, the university departments and faculties.

Block grants: - State current funding model for universities, that specifies funding of universities according to their teaching inputs, teaching output, institutional character, and research output.

Earmarked grants: - State current funding model for university special cases for development.

SECTION A

PERSONAL AND BIOGRAPHICAL DETAILS

Mark the appropriate box with a cross (X).

1. Please indicate your sample category.

NO.	Gender	
1.1	Executive Management	
1.2	Head of Department (HoD)	
1.3	Academic Lecturer	
1.4	Finance Officer	

2. Please specify your gender.

NO.	Gender	
1.1	Male	
1.2	Female	

2. Please indicate your age group (in years).

NO.	Age group	
2.1	Under 25 years	
2.2	26-39 years	
2.3	40-49 years	
2.4	50-59 years	
2.5	60 years and above	

3. Please tick your appropriate highest qualification.

NO.	Type of Qualification	(Option)
3.1	National Senior Certificate (Matric)	
3.2	National Diploma	
3.3	Bachelor's Degree	
3.4	Honours Degree/Post-graduate diploma	
3.5	Master's Degree	
3.6	Doctoral/PhD Degree	
3.7	None	

4. Please tick your highest qualification category.

NO.	Qualification category	(Option)
4.1	Accounting and Informatics	
4.2	Applied Sciences	
4.3	Arts and Design	
4.4	Engineering and the Built Environment	
4.5	Health Sciences	
4.6	Management Sciences	

5. Please tick your years of experience in an institution of higher learning.

NO.	Experience category	(Option)
5.1	0-5 years	
5.2	6-10 years	
5.3	11-15 years	
5.4	16-20 years	
5.5	21 years and above	

SECTION B

Please indicate your answer by placing an 'X' in the appropriate box to indicate your response.

6. Please rate your knowledge of DUT's revenue sources.

NO.	Rating	(Option)
6.1	Poor	
6.2	Moderate	
6.3	Satisfactory	
6.4	Good	
6.5	Advanced	

7. Please rate your knowledge of DUT's financial sustainability.

NO.	Rating	(Option)
7.1	Poor	
7.2	Moderate	
7.3	Satisfactory	
7.4	Good	
7.5	Advanced	

(1=Strongly Disagree, 2=Disagree, 3=Neutral, 4=Agree and 5=Strongly Agree).

8.	DUT's funding challenges experienced.	1	2	3	4	5
8.1	Revenue sourcing is a financial challenge for the university.					
8.2	The knowledge and skills of university management are the barriers to university revenue generation strategies.					
8.3	Low research output, is among reasons for low state funding, through block grants.					
8.4	The university post-graduate students complete their degrees within the minimum timeframe which enhances research output.					
8.5	The university staff do not have adequate knowledge to generate additional strategies for revenue sourcing.					
8.6	The university staff do not have adequate resources to generate additional strategies for revenue sourcing.					
8.7	The university is unable to improve its infrastructure and thereby increase student enrolments.					
8.8	DUT is unable to attract personnel with experience in attracting funding for the university.					

9.	Evaluating each revenue stream	1	2	3	4	5
9.1	First-stream income					
9.1.1	The state subsidy grant contributes sufficiently to the financial sustainability of the university.					
9.1.2	The university could generate more income from increasing its research outputs as per the block grants.					
9.1.3	The university's throughput rate is continuously increasing to enhance revenue generated from the state as per the block grants.					
9.1.4	The university has the necessary student support mechanisms to improve throughput rates and thereby generate more revenue from the block grants.					
9.1.5	The earmarked grants contribute adequately to the overall university development and standards for meeting targets.					
9.2	**Second-stream income**					
9.2.1	The block grant earned through research output is an important contributor to DUT's financial sustainability.					
9.2.2	The revenue generated from tuition fees is sufficient to maintain the financial sustainability of the university.					
9.2.3	The university always meets its enrolment targets.					
9.2.4	The university could generate more income from tuition fees if it increases its student intake.					

9.2.5	The annual increase of tuition fees is still an effective mode of increasing revenue from second-stream income.					
9.2.6	The tuition fee freeze had a significant impact on the university's financial sustainability.					
9.3	**Third-stream income**					
9.3.1	The revenue generated from third-stream income is sufficient to maintain the financial sustainability of the university.					
9.3.2	Most university segments are now offering short-courses and certificates.					
9.3.3	The university has strategic teams working with donors to attract more funds from donor funding.					
9.3.4	The university is offering commercialised services to the external community.					
9.3.5	The university have adequate research contracts contributing to the enhancement of third-stream income.					
9.3.6	The university investment activities yield greater returns for the university.					

10.	Revenue generation strategies at DUT	1	2	3	4	5
10.1	Diversification of revenue sources is the key solution to the university's financial sustainability.					
10.2	Financing university through single source revenue (that is, either first, second or third-stream income) is a financially sustainable decision.					
10.3	The university segments can partner with industry to conduct a need analysis and identify possible short courses.					
10.4	The university segments are essential pillars for generating additional revenue strategies for the university.					
10.5	The university have necessary strategies and skills to enhance revenue from third-stream income.					
10.6	The university is offering commercialised research to the external community as a model of sourcing more funds for the university.					
10.7	The university's commercial ventures to the external community includes consultancy and professional services.					
10.8	Implementation of new course offerings is a contributor to the university's financial sustainability.					
10.9	DUT is attracting international students as a model for enhancing its revenue generation strategies.					
10.10	Investment in student support mechanisms is the key solution to increasing throughput rates.					
10.11	Expansion of infrastructure is used to increase student enrolments hence growing revenue.					

10.12	International collaborations can enhance the research output.					
10.13	Improved staff qualifications will increase research output.					

11. Is there anything you would like to add about DUT's revenue challenges?

11.1	11.2
Yes	No

11.3 If responded "Yes" above, please provide your opinion/view:

12. Is there anything you would like to add about DUT's revenue generation strategies?

12.1	12.2
Yes	No

12.3 If responded "Yes" above, please provide your opinion/view:

I extend my utmost appreciation for your participation.

Yours gratefully,

Xolani Ngcobo