Cost efficiency at South African universities

by

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Declaration

I, Carla Serfontein, declare that the thesis that I herewith submit for the Doctoral Degree Doctor of Philosophy with specialisation in Management Accounting at the University of the Free State, is my independent work, and that I have not previously submitted it for a qualification at another institution of higher education.

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Consistent use of terminology

As a result of the variables tested and reported on in this study described by using capital letters in a specific way, the researcher decided to use the related terms consistently throughout the study. The following terms and concepts with capital letters as stated were used:

- Academic Salaries
- Budgeted benchmark
- Budget
- Difference between Actual and Budgeted Revenue
- Difference between Budgeted and Actual Expenses
- Direct cost
- Expense(-s)
- Government Grants/Subsidies
- Income
- Index
- Indirect cost
- Other Salaries
- Overhead(-s)
- Revenue
- Salaries
- Subsidies and Grants
- Total Expenses
- Total Revenue
- Tuition Fees

Abstract

Universities are at a crossroads. Globally, the Fourth Industrial Revolution (4IR), expedited by the COVID-19 pandemic, and the looming Fifth Industrial Revolution (5IR) have changed the higher education landscape as we know it. Students can now study at the best universities in the world through technological innovation at a fraction of the cost of traditional university education. Traditional universities have lost their competitive advantage regarding geographic location, relevance, content, and mode of delivery. Universities must adapt to the changing business environment brought about by technological innovation and the 4IR or face the consequences.

It seems unavoidable that the enrolments at most traditional universities will decrease significantly in the near future due to increased competition in terms of relevance and more affordable international online education. What happens when students can study more relevant modules for free at the best institutions in the world? What happens to universities if student numbers decline when most university costs are fixed? How will these institutions cover their costs if their funding decreases significantly in an industry notorious for its slow pace of adapting to change?

Worldwide it is already happening that student numbers are declining, and universities globally are experiencing major financial sustainability problems (theoretical focus of this study). South African students are poor, with substandard secondary education, seeking relevant, affordable education that will ensure employability. However, all indications are that South African universities failed to meet students' demands, raising Tuition Fees substantially over the last decade or two and continuing to do so. Declining government subsidies also imply that affordable education is not a given without some drastic changes.

The empirical focus of this study was to establish why South African universities had to increase their Tuition Fees over the last decade in times of increasing enrolments and what the potential consequences would be if the student enrolments had to decline in the future. This was the reason why the period of financial analyses was chosen from 2010 to 2019, before the COVID-19 disruption.

Traditional universities globally and in South Africa will have to make drastic decisions changing both ‘What’ and ‘How’ they teach. Universities require the thorough application of Management and Cost accounting to obtain relevant and accurate information to aid in their decision-making process to improve their efficiency. However, there exists a gap between the need for universities to apply Management and Cost accounting and the available knowledge on how to use it effectively in the diverse service setting of a university.

Therefore, this study's primary objective was to apply Management and Cost accounting principles to assess the efficiency of South African universities as typical service organisations in a disruptive environment. The study used quantitative, exploratory research based on secondary data in the public domain to achieve the primary objective. The Financial Statements from a sample of 16 from the 26 publicly funded universities in South Africa were analysed financially and statistically from 2010 to 2019, using both descriptive and inferential statistics.

The sampled universities’ Financial Statements for 2010, 2015 and 2019 were gathered and analysed. The descriptive statistics performed considered the composition and growth of the three Revenue streams and Expense categories of the sampled universities applicable to this study from 2010 to 2019. Inferential statistics were applied using inflation and the growth in Teaching Input and Teaching Output units (TIOUs) to calculate a Budgeted benchmark for the related Revenue streams and Expense categories. These Budgeted benchmarks were then compared to the actual amounts of the related Revenue and Expense items and the significance of the difference tested. Regression analysis was also applied to determine the impact of TIOU growth on Total Revenue and Total Expenses as well as the relationship between the Difference in Budgeted and Actual Expenses and Actual and Budgeted Revenue.

From the empirical part of this study, it seems that universities did not manage their Expenses efficiently. More concerning is the fact that Expenses increased above inflation and the growth in enrolments. This increase was also primarily a result of increases in Indirect costs; thus an Expense category without any causal relationship to the outputs (number of enrolments) at a university. Universities in South Africa further

did not deliver on their objective of providing affordable education that will ensure employability since the increase in Expenses (primarily Indirect) was funded by Tuition Fees rising significantly above inflation and growth in enrolments, justifying the call from students in 2015 that #FeesMustFall.

Another critical finding from the empirical part of this study is that universities depended on enrolment growth to fund the increase in Expenses. In an environment dominated by fixed costs, an increase in enrolments should not have resulted in a significant increase in Expenses. Universities should have benefited from Economies of Scale, becoming more efficient in the managing of their Expenses, but this does not seem to be the case. The research questions to be answered are what will happen if enrolments start to decline because of factors such as online teaching becoming the norm, or more affordable and relevant education become available? Add the fact that Salaries represent the major Expense at South African universities in a country with some of the strictest labour laws in the world, how long will it take these universities to become financially viable again? This study provides answers to the stated questions and makes recommendations that could assist universities in applying Management and Cost accounting to manage the disruption they are facing.

Keywords: Management and Cost accounting, universities, efficiency, Economies of Scale, Direct cost, Indirect cost, decision-making, enrolments, Teaching Input Units, Teaching Output Units, Tuition Fees, Subsidies and Grants, Academic Salaries, Other Salaries.

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TO WHOM IT MAY CONCERN

Herewith I, **Cornelia Geldenhuys (ID 521114 0083 088)** declare that I am a qualified, accredited language practitioner and that I have edited the following doctoral thesis:

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by

Carla Serfontein

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List of acronyms and abbreviations

3D	Three Dimensional
4IR	Fourth Industrial Revolution
5IR	Fifth Industrial Revolution
ABB	Activity-Based Budgeting
ABC	Activity-Based Costing
ABM	Activity-based Management
Agri	Agriculture, Agricultural Operations and Related Sciences
AI	Artificial Intelligence
BE	Breakeven
CEO	Chief Executive Officer
CESM	Classification of Education Subject Matter
CFO	Chief Financial Officer
CHE	Council on Higher Education
COVID-19	Novel Coronavirus of 2019
CPI	Consumer Price Index
CPUT	Cape Peninsula University of Technology
CUT	Central University of Technology
CVP	Cost, Volume, Profit analysis
DEA	Data Envelopment Analysis
Df	Degrees of freedom
DHET	Department of Higher Education and Training
DIRAP	Directorate for Institutional Research and Planning
DUT	Durban University of Technology
ERP	Enterprise Resource Planning Systems
EVA	Economic Value Added
EY	Ernst and Young
FTE	Full-Time-Equivalent Enrolments
GAAP	Generally Accepted Accounting Principles
GDP	Gross Domestic Product
GHREC	General/Human Research Ethics Committee

IASB	International Accounting Standards Board
IFRS	International Financial Reporting Standard
IMA	Institute of Management Accountants
Infl	Inflation
IoT	Internet of things
IT	Information Technology
MIT	Massachusetts Institute of Technology
MOOCs	Massive Open Online Courses
MUT	Mangosuthu University of Technology
NL	Natural Log
NMU	Nelson Mandela University
NQF	National Qualifications Framework
NSFAS	National Student Financial Aid Scheme
NWU	North-West University
NYSE	New York Stock Exchange
OP/IP	Output/Input relationship
P/G	Postgraduate
RHODES	Rhodes University
RM	Revenue management
ROU	Research Output Unit
SA	South Africa
SAICA	South African Institute of Chartered Accountants
SBTC	Skill-biased technical change
SCM	Strategic cost management
SG&A	Selling, general, and admin
Sig	Significance
SMH	Société Suisse de Microélectronique & d'Horlogerie
SMU	Sefako Makghato Health Sciences University
SPU	Sol Plaatje University
SPSS	Statistical Package for the Social Sciences
Std	Standard
Std Dev	Standard Deviation

STEM	Science, Technology, Engineering and Math
SU	Stellenbosch University
TIOU	Teaching Input Units plus Teaching Output Units
TIU	Teaching Input Unit
TOU	Teaching Output Unit
TUT	Tshwane University of Technology
U/G	Undergraduate
UCT	University of Cape Town
UFH	University of Fort Hare
UFS	University of the Free State
UJ	University of Johannesburg
UK	United Kingdom
UKZN	University of KwaZulu Natal
UL	University of Limpopo
UMP	University of Mpumalanga
UNISA	University of South Africa
Univ	Conventional university
UoT	University of Technology
UP	University of Pretoria
US	United States
USAF	Universities South Africa
UV	University of Venda
UWC	University of the Western Cape
UNIZULU	University of Zululand
VUT	Vaal University of Technology
WEF	World Economic Forum
Wght	Weighted
WHO	World Health Organisation
WITS	University of the Witwatersrand
WSU	Walter Sisulu University
ZBB	Zero-Based Budgeting

Chapter 1 – Introduction to the study

1.1. *Introduction and background to identify the real-world problem*

In 2017, before the additional challenges brought on by COVID-19, Professor Clayton Christensen from Harvard Business School predicted that half of the 4 000 United States (US) colleges and universities would be bankrupt within 10 to 15 years due to disruption caused by innovation (Hess, 2017, para. 1; Smit and Serfontein, 2020, para. 4). The COVID-19 pandemic and the resulting fast-tracking of the Fourth Industrial Revolution (4IR) proved the truth behind his prediction. South African universities are not far behind, with South Africa's Minister of Higher Education, Science and Technology predicting that many universities may face a financial crisis (Naidu, 2021, para. 1). Universities South Africa's (USAF) Chief Executive Officer (CEO) confirmed the seriousness of the financial trouble faced by South African universities (Naidu, 2021, para. 13). According to the Executive Director responsible for finance at the University of Pretoria, South African universities are facing financial pressure for various reasons, including, but not limited to, COVID-19 (Koornhof, 2020, para. 1).

1.1.1. Universities and COVID-19

In December 2019, an outbreak of collective pneumonia in Wuhan, Hubei Province, China, started a global pandemic. In January 2020, the World Health Organisation (WHO) identified this collective pneumonia as a novel coronavirus (hereafter COVID-19). The virus spread throughout China and, unintentionally, internationally (Wang *et al.*, 2020, p. 36). COVID-19 also reached South Africa, causing a National State of Disaster announcement, resulting in a total lockdown from 26 March 2020 (Mahlati, 2020, paras 8–10). The initial lockdown was for 21 days, but was extended for two weeks, and although some restrictions still applied, South Africa only lifted the National State of Disaster from 5 April 2022, with all restrictions lifted on 4 May 2022 (Mahlati, 2020, paras 10–11; Staff writer, 2021b, para. 4, n.d. c, para. 1). Universities worldwide closed their campuses for face-to-face instruction as a result of COVID-19 and have transitioned, or are in the process of transitioning to remote online teaching and learning (see section 3.5.2.) (Hess, 2020, para. 1; Peters *et al.*, 2020, p. 2; El Said, 2021, p. 1).

Pandemics have a history of forcing humanity to reimagine the world and let go of the past. The 2019 COVID pandemic has forced universities globally to reimagine disciplines and redefine these organisations' roles in society (Peters *et al.*, 2020, p. 6). COVID-19 and the disruption that has accompanied it with regard to universities mean that these institutions can no longer be ‘everything to everybody’. Government-funded, traditional universities are known for high levels of cross-subsidising modules, programmes, and degrees, but they cannot allow this kind of approach anymore (Serfontein and Smit, 2021, p. 173).

1.1.2. Disruption in the higher education environment

The mere mention of the 4IR in South Africa has raised the fear of job losses due to the prediction of people being replaced by machinery (Mahlaka, 2020, para. 14). The 4IR is characterised by advances in technology such as Artificial Intelligence (AI) and automated machines, changing how humans live, work, and interact with the rest of the world (Mahlaka, 2020, para. 2). The advances in automation as characterised by the 4IR will not only impact all aspects (including the nature) of the work we perform, but also the daily environment of humans (World Economic Forum [WEF], 2016, p. v; Adendorff, Lutshaba and Shelver, 2018, p. 8; Omarjee, 2018, para. 3; Yang *et al.*, 2018, p. 4; Prifti, 2019, p. 1).

The disruption resulting from the 4IR affects employability and business models, eventually affecting business education (WEF, 2016, p. 3). Additionally, COVID-19 and the resulting global lockdowns caused universities worldwide to rush to prepare to move to online learning, changing their mode of operation and delivery of programmes (Editorial, 2020d; Elers, 2020, paras 3–4; Lau, Yang and Dasgupta, 2020, para. 9; Medical News Today News Team, 2020, para. 1; Peters *et al.*, 2020, p. 2). What is undeniable is that online learning is here to stay. It has fast-tracked the 4IR and seriously impacts the conventional competitive advantage of geographical location. As a result, traditional universities must adapt or bear the consequences.

The exact impact of the 4IR on higher education has caused a broad debate. The development of education and training systems to suit the previous industrial revolutions took decades. This luxury is not awarded to the 4IR, since the pace of educational change is so rapid that 50% of the knowledge accumulated by first years in a four-year technical degree will be obsolete when these students graduate four years later (WEF, 2016, p. 20). Therefore, a key challenge emanating from the 4IR is to ensure that graduates who transfer to employees are equipped with the relevant competencies required for their occupations (Prifti, 2019, pp. 1–2; Mahlaka, 2020, para. 14). To ensure the competence of graduates, universities must intervene actively, but history has taught us that these institutions are often slow in embracing the call for changes (Hattingh, 2016, pp. 1–3; Menon and Castrillon, 2019, para. 3).

Increasing the concerns surrounding the disruption initiated by the 4IR is the lack of congruency between the skills needed in a changing job market and the skills obtained by graduates (Ubell, 2010; Mesquita, Peres and Xing, 2015). Instructors and students require updated and new information, tools and skills to navigate the changes brought about by the disruption to the world as we know it (Ehlers, 2020, pp. 1–20).

A further threat to the existence of traditional universities (with a primarily face-to-face and on-campus business model) is open education. The COVID-19 crisis has sparked an increase in the public debate regarding the value of open and mass higher education (Peters *et al.*, 2020, p. 724). The creation of Massive Open Online Courses (MOOCs) intensified the narrative that open education could replace the current business model of traditional universities (Rabin, Kalman and Kalz, 2020, p. 83).

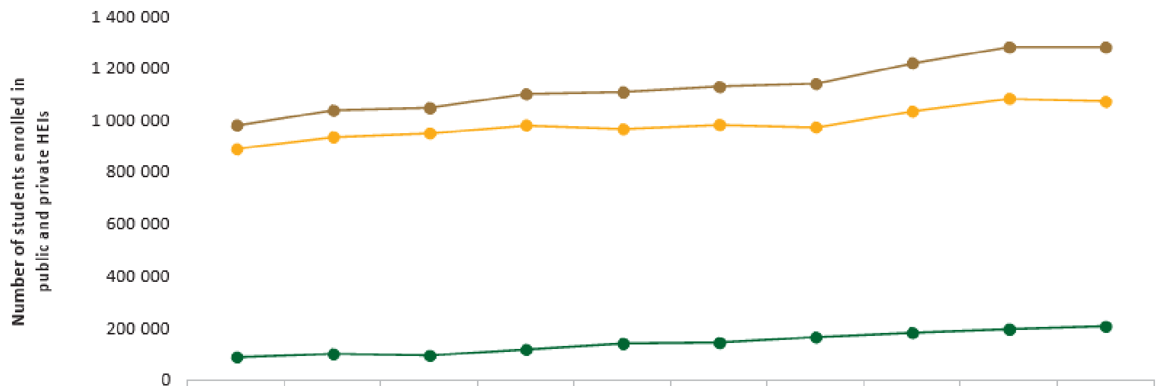
Open education started with open access to the content of courses and access to online courses at no cost. Subsequently, some universities began to accept MOOCs, experiential learning, and free courses for partial credits towards a degree. Following the introduction of MOOCs, the next predicted disruptor in open-source education is an entirely free, fully online curriculum that leads to a degree accredited by certain universities. This new business model could enable students to attend the entire course for free and only pay for the certification of their credentials. The free access to degree-granting curricula could threaten the current business model of traditional universities (Mazoue, 2013, para. 1).

A further disrupting factor affecting traditional universities is the upsurge in the number of private higher education organisations. The existence of higher education itself is under pressure because of the ongoing emphasis on the relationship of service providers and clients, as well as comparing universities to content providers in the private sector (Peters *et al.*, 2020, p. 724). Where private higher education organisations are financially independent, the traditional universities, however, remains dependent on government funding.

1.1.3. Government funding

Since 2010, the number of enrolments in South Africa's whole higher education system has grown substantially. Figure 1.1 shows the increase in student enrolments in higher education in South Africa from 983 703 in 2010 to 1 283 890 in 2019, an increase of 30.5%.

Figure 1.1: Number of students enrolled at public and private higher education institutions, 2010–2019



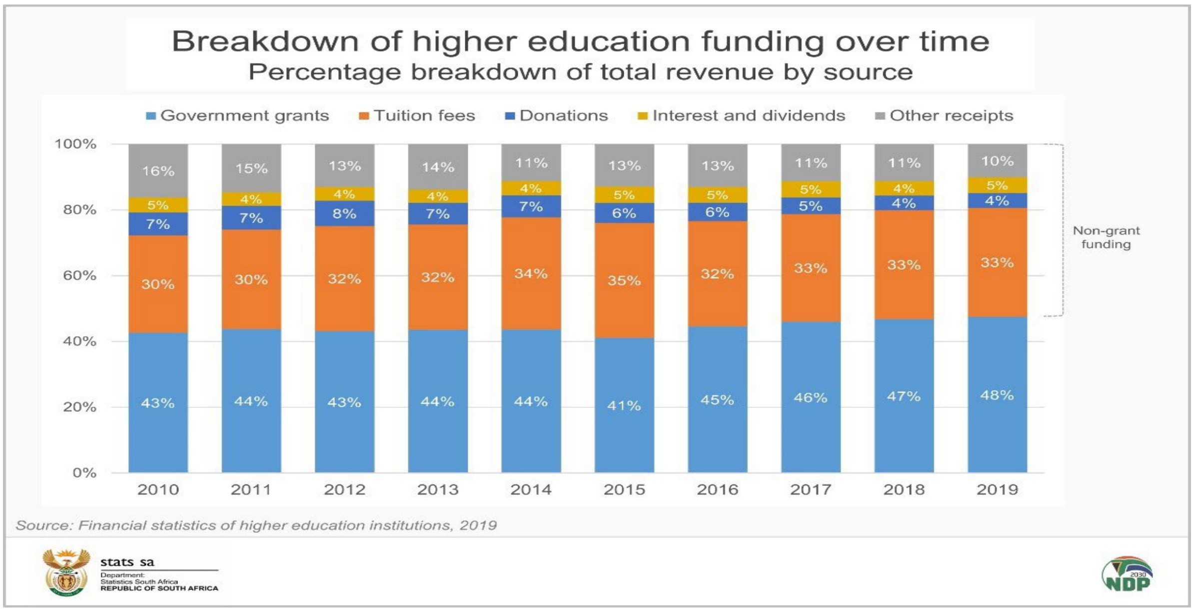
	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Total	983 703	1 041 237	1 050 851	1 103 639	1 111 712	1 132 422	1 143 245	1 222 030	1 283 466	1 283 890
Public HEIs	892 936	938 201	953 373	983 698	969 155	985 212	975 837	1 036 984	1 085 568	1 074 912
Private HEIs	90 767	103 036	97 478	119 941	142 557	147 210	167 408	185 046	197 898	208 978

Source: Department of Higher Education and Training [DHET] (2021a, p. 8).

Unfortunately, government subsidies did not keep up with the growth in student enrolments. From 2008 to 2015, government funding declined as a portion of total university Income, widening the gap between state-funded and non-state-funded Income. From 2015, the gap narrowed again with a noticeable acceleration of government funding, with non-state funding slowing down (Editorial, 2020f, para. 8).

The effect was that the subsidy per student (if the impact of inflation is considered) declined steadily, with a further expected decrease of 7% in real terms from 2020/21 to 2023/4 (Koornhof, 2020, para. 7; Mtshali, 2020, para. 19; Burger and Mboweni, 2021, para. 7). The breakdown of university funding is illustrated in Figure 1.2. As seen in Figure 1.2, even though the portion of university funding coming from Government Grants have increased since 2015, Tuition Fees, after the initial increase, have decreased to some extent (from 35% in 2015 to 33% in 2019). Focusing on Tuition Fees, at 33% in 2019 it is still relatively higher than in 2010 at 30%.

Figure 1.2: Various sources of higher education funding from 2010 to 2019



Source: Editorial (2020f, para. 10).

In 2000, 49% of universities' Budgets comprised Government Grants. This portion decreased to 47% in 2018 (Cloete and Wangenge-Ouma, 2008, p. 907; Crous, 2017, p. 4; Heher, 2017, p. 257; Statistics South Africa, 2019, p. 9). The National Student Financial Aid Scheme [NSFAS] in South Africa that increases access to higher education for students coming from households with a household Income of up to R350 000 puts further pressure on the DHET's Budget (Koornhof, 2020, para. 8).

The result of COVID-19 in South Africa was expressed in the announcement by the South African Minister of Higher Education, Science and Technology, that the DHET's Budget for 2020/21 will be reduced from an initial R116.9 billion to R107.0 billion, a reduction of 8% (Gerber, 2020, para. 1,4; Naidu and Dell, 2020, para. 7). Part of this reduction is a 1.7% decline in the Block Grant to universities, equating to around R400 million (Koornhof, 2020, para. 10).

The decrease in the Budget for the DHET comes at a time when universities' spending increased considerably in an attempt to retrain staff and the required investment in technology (Smit and Serfontein, 2020, para. 2). According to the Vice-Chancellor of Walter Sisulu University (WSU), some of the additional Expenses brought about by the COVID-19 pandemic are electronic devices to students to enable participation in the blended learning environment and connectivity infrastructure. It is unlikely that institutions will recover 100% of these costs (Naidu and Dell, 2020, paras 22–23).

South African youth are poor and seek relevant, affordable education that will ensure employability (Smit and Serfontein, 2019, pp. 1332). Unfortunately, South African universities' declining government subsidies were counteracted by Tuition Fees rising above the national inflation rate, not necessarily improving the affordability of higher education (Smit and Serfontein, 2019, pp. 1–2). Focusing on employability, South African universities risk losing their relevance, since even if a student can afford higher education, they are not guaranteed a job. The possible lack of relevance of universities is further highlighted by an increase in the official South African unemployment rate of 1.7% in the last quarter of 2020, a crisis "*aggravated by a COVID-19 lockdown*" (Mahlaka, 2021, para. 4).

Another element to consider when discussing the affordability of higher education in South Africa is NSFAS. In 2020, NSFAS funded 42% of students enrolled at universities in South Africa (Koornhof, 2020, para. 17). NSFAS received over 750 000 applications for the 2021 academic year, a 25% increase of 185 000 applications from 2020 (25%) (Naidu, 2021, paras 4–5). As a result of the increased unemployment due to COVID-19, some students will also move into the "*missing middle*" category (students too poor to be able to afford a higher education, but not poor enough to qualify for funding), which increases one of the key risks South African universities face, namely unpaid Tuition Fees (Koornhof, 2020, para. 19; Naidu, 2020).

However, the possibility remains that even if COVID-19 had not erupted, higher education would still face a deep structural crisis. One aspect of this crisis is inflating student debt (Peters *et al.*, 2020, p. 740). Maintaining big university campuses is costly, and Tuition Fees have increased to a point where students can no longer pay (Peters *et al.*, 2020, p. 740). This is also evident in South Africa, where historic student debt at universities is currently around R14 billion (Burger and Petersen, 2021, para. 6; Govender, 2021, para. 4).

Another challenge faced by universities is the increase in university spending. Reasons for this rise in spending are sociocultural, economic, and demographical (Kostić, Jovanović and Jurić, 2019, p. 131). The increased competition amongst universities brought about by market forces in this industry caused a vast expansion of institutions. Although some universities dealt with their efficiency, existing resources struggle to meet the demand brought about by increasing student numbers (Kostić *et al.*, 2019, p. 132). Universities require new resources and efficient and effective service delivery to keep up with the increase in student numbers and the government's inability to finance this increase (Lutilsky, Žmuk and Dragija, 2016, p. 132).

The increase in student numbers, coupled with the decrease in government subsidies, led to universities increasing Tuition Fees to maintain their expenditure (Burer and Fethke, 2016, p. 182; Koornhof, 2020, para. 7; Mtshali, 2020, para. 19). Unfortunately, with COVID-19, the 4IR and the ongoing protests at South African universities, it seems that higher education has not been operating efficiently. With the increase in student numbers, the fixed nature of university spending (refer to section 1.4.3.) and the innovation in technology experienced globally, universities should have benefited from Economies of Scale and have been operating more efficiently. The continual increase in Tuition Fees suggests that this might not have been the case.

The question on every stakeholder in higher education's lips is how traditional universities will acquire the financial resources, other than Government Subsidies, to enable these organisations to implement the drastic changes required to stay relevant without losing their sustainability and financial viability? The decision-makers at traditional universities have a daunting task ahead and "*it cannot be business as usual at the university*" (Menon and Castrillon, 2019, para. 8). The application of Management and Cost accounting may be one solution to address the inefficiency problem.

1.1.4. Management and Cost accounting and services

An essential part of managing the COVID-19 pandemic was to ensure the financial sustainability of universities (Koornhof, 2020, para. 3). One initiative from universities to ensure financial sustainability was the move to online education. According to the Vice-Chancellor and Rector of Stellenbosch University (SU), online teaching and learning is "*here to stay*" (Naidu, 2020, para. 36). To ensure their sustainability, universities will require human and financial resources to deal with the transformation they are facing. As a result, researchers have focused on university crisis management to deal with the anticipated disruption but have not addressed the solution to ensure financial sustainability (Koornhof, 2020, para. 2).

"*Frequent, unforeseen, potentially threatening, and disruptive incidents*" require fast strategic decisions by management subject to severe time pressure (Netz, Svensson and Brundin, 2020, p. 1). In the current global economic climate, management's timeliness and quality of decisions are the main drivers for any organisation's operating efficiency (Khromova, 2020, p. 247). Quality and timely decisions require accurate, relevant, and complete data (Lale and Andelokovic, 2014, p. 167; Khromova, 2020, p. 247). The necessary data for the decision-making needs of managers are primarily sourced from the Management Accounting system of an organisation (Lale and Andelokovic, 2014, p. 167; Odar, Kavcic and Jerman, 2015, pp. 84–86; Ciuhureanu, 2018, p. 282; Tenhunen and Danielescu, 2018, p. 41). On the one hand, cost data and methodologies from Management and Cost accounting are essential in the decision-making process, whether an organisation is private, public, not-for-profit, profitable, large, or small (Lawson and White, 2018, para. 27; Persaud, 2020, pp. 2–3). On the other hand, decision-making based on Financial Accounting information (focused primarily on the external environment) could lead to "*disastrous results*", including, but not limited to, bankruptcy (Lawson and White, 2018, p. 28).

A 2003 survey performed by Ernst & Young and the Institute of Management Accountants reports that many manufacturing and non-manufacturing organisations use Cost accounting systems that provide managers with incorrect and often irrelevant costing information (Nowacki *et al.*, 2003, p. 3). In another survey performed in 2012 by Ernst & Young and the Institute of Management Accountants, all respondents indicated that in some manner, costs provided by the Cost accounting systems implemented at organisations are distorted. Adding to the response on the distortion of costs, 35% to 45% of respondents indicated a significant impairment in the accuracy of costs, mainly due to Overhead allocations (White and Clinton, 2012, p. 50; Terzioglu and Chan, 2013, p. 33). Many of the respondents (34%) in the mentioned survey were involved in service organisations (Terzioglu and Chan, 2013, p. 33). One of the main findings of this survey is that a climate of economic downturn generates a greater demand for more accurate costing information, but that organisations do not regard cost reduction as the primary way to improve the bottom line (White and Clinton, 2012, p. 43; Terzioglu and Chan, 2013, p. 33).

The application of Management and Cost accounting is a field that was initially created to be applied in the manufacturing industry (Terzioglu and Chan, 2013, p. 29; Patil and Kshatriya, 2016, p. 47). The modern business environment, however, is characterised by an increase in service delivery organisations. A steep rise in the contribution of the service sector to the Gross Domestic Product (GDP) is seen in most countries (South Africa, 61.45% in 2020) (Terzioglu and Chan, 2013, p. 29; Buckley and Majumdar, 2018, para. 1; Editorial, 2021, para. 1). Unfortunately, most empirical research on Management and Cost accounting focuses on manufacturing goods while services are receiving much less attention (Terzioglu and Chan, 2013, p. 29). Moreover, prior research on Management and Cost accounting is limited to adopting and designing systems, not necessarily applying and implementing Management and Cost accounting principles (Kajüter and Schröder, 2017, p. 72). There also exists very little research on the cost structure of service organisations (Terzioglu and Chan, 2013, p. 33). The existing research on service organisations' cost structure is incomplete, scattered and outdated (Terzioglu and Chan, 2013, p. 34). Mohr (2017, p. 92) reiterates the lack of research on the application of Cost accounting at departmental and service levels, especially on its application in government organisations.

Since the characteristics of service products differ significantly from goods, costing systems initially designed for the manufacturing industry might not be appropriate for the service industry (Terzioglu and Chan, 2013, p. 30). Intangibility, heterogeneity, perishability and inseparability of consumption and production are characteristics of services (Kamal Basha, Sweeney and Soutar, 2015, pp. 173–174). A manufacturing organisation can specify all the parts used in their production process, with one product using many parts, while another uses only a few parts. Contrary to manufacturing organisations, the cost objectives of service organisations (services) rely in differing measures on support activities, which can be challenging to pin down (Gripper, 1995, p. 27).

It is unimaginable that service organisations can be managed when decisions are taken using information generated by a Management and Cost accounting system prone to errors and that is unreliable (Terzioglu and Chan, 2013, p. 30). Accurate costing information is essential for four reasons:

1) the final price of a cost objective is primarily dependent on the cost of the related cost objective;
2) the profitability and performance of cost objectives are determined based on the costs of the cost objective;
3) accurate cost information aids an organisation to distinguish between profitable and non-profitable cost objectives; and
4) decisions regarding capital allocation and the introduction of cost objectives rely on accurate cost information (Terzioglu and Chan, 2013, p. 33).

In service organisations, most of the costs incurred in delivering the service are not explicitly related to the provision of the service. They are reported as period and not product costs in the period in which they are incurred. Period costs are subjectively allocated to the service delivered, possibly distorting the cost of the service (Terzioglu and Chan, 2013, p. 32; Drury, 2018, pp. 26–27). A further difficulty encountered in the costing of services is that the service industry is labour intensive, with most Labour costs fixed, as a minimum, in the short term (Terzioglu and Chan, 2013, p. 32). Although true for service organisations in general, it is also true for universities, causing a lack of a direct, causal input-output relationship. Due to the lack of a direct, causal relationship between the costs incurred in delivering a service by universities and the output (cost objective), these organisations' application of Management and Cost accounting is severely constrained (Serfontein, 2019, p. 11).

Universities are complex service organisations due to the diversity of the services delivered (a wide range of modules, differing in credits, National Qualifications Framework (NQF) levels and the number of enrolments) (Kamal Basha *et al.*, 2015, pp. 173–174; Serfontein, 2019, p. 7). A further complication in measuring the outputs of a university is the variety of activities taking place, i.e. teaching, research and activities generating Third-stream Income (see section 4.2.) (Saladrigues and Tena, 2017, p. 120; Sisa, Siklosi and Szijarto 2018, p. 280). The diversity of the services delivered by universities and the intangible nature associated with services complicate identifying an output unit. This causes a lack of an input-output relationship, increasing the complexity of calculating the cost of delivering a service (Gripper, 1995, p. 26; Terzioglu and Chan, 2013, pp. 30, 35). The discretionary and committed Fixed costs (see section 2.7.1.) at universities provide additional challenges to these organisations and significantly impact their efficiency.

1.1.5. Universities and efficiency

At universities, with most of the costs incurred being discretionary and committed fixed costs, an increase in enrolments should decrease the cost per enrolment (Moore, 1998, p. 76; Szychta, 2010, p. 49; Serfontein, 2019, p. 20). Consequently, universities should have benefited from Economies of Scale and become more efficient. However, the whole higher education sector suffered from serious cost inefficiencies over the last few decades (Pathak and Palvia, 2021, p. 36). Since the dawn of the internet, various industries such as travel, services, government, entertainment, publication, and retail have benefited from technology and the internet to improve their efficiency. Universities, however, have not fully capitalised on the efficiency of an online platform (Pathak and Palvia, 2021, pp. 36–37).

Organisational efficiency should continually guide a university towards its goals by frequent measuring to make improvement plans and provide information on organisational performance. Part of the lack of efficiency in universities is the central Budget administration process, anchored in tradition (Burer and Fethke, 2016, p. 182). This Budgeting process sees a programme's current cost allocations based on the previous year's allocation, with only a similar percentage increment for all programmes (Mojahedian *et al.*, 2020, p. 2).

1.1.6. Universities and relevance

Another crisis universities face is that they can no longer guarantee employment to graduates once they have obtained a higher degree (Mok, Wen and Dale, 2016, p. 266). Even though it is not the responsibility of a university to guarantee employment, it can be reasonably expected of a university to take the steps required to increase the possibility that graduates will be employable (Holmes, 2013, pp. 540–541). The concern regarding a crisis where students are qualified for jobs that might not continue, instead of obtaining the skills required to ensure employability, is increasing (Editorial, 2014, p. 1; Frey and Osborne, 2017, pp. 269–278; RBC, 2018, p. 2).

An additional complication to consider when discussing the relevance of what universities are teaching is Artificial Intelligence (AI). AI means that computers are exponentially increasing their understanding of the world. Already in 2016, a computer could beat the world's best Go (a Chinese game more complicated than chess) player. Even more significant is that this defeat happened ten years earlier than expected (Collub, 2016, para. 4; Editorial, 2016c, para. 3). AI algorithms in the prediction and diagnosis of cancer are already improving the accuracy of cancer proneness, survival, and recurrence predictions (Huang *et al.*, 2020, p. 61).

AI could demonetise the entire legal industry, possibly replacing entry-level lawyers. Some predictions are that generalist lawyers will decrease by 90%, with only specialists needed in the future. In London, most law firms are already using AI, causing predictions of staff cuts (Flinders, 2018, para. 1; Bhandari, 2020, para. 4). Computers will be more intelligent than humans by 2030 (Collub, 2016, para. 6). According to Omarjee (2018, par. 3), the evolution of the utilisation of machines in the workplace could displace 75 million jobs between 2018 and 2022. Additionally, it could also create 133 million new positions, but in new and different fields of specialisation (WEF, 2016, p. v; Omarjee, 2018, para. 6; Prifti, 2019, p. 1). Thus, universities should seriously consider the extent to which they are ethical in chasing enrolments in existing degrees that will not necessarily ensure employability and could soon be replaced by technology.

1.2. Problem statement

Universities are at a crossroads. How universities teach, both in terms of skills and online or blended learning, has already changed and will continue to change. The historical competitive advantage of traditional universities was the geographical location and the cost of education, amongst others. This competitive advantage will soon cease to exist as the world is moving towards online education, which implies that students can study at the best institutions in the world (Collub, 2016, para. 21). If traditional universities want to compete with the growing open-source courses available, they will have to make some drastic changes, or they are facing a financial crisis (Cabrera and Fernández-Ferrer, 2017, p. 48; Hess, 2017, 2020, para. 3; Koornhof, 2020, para. 1; Smit and Serfontein, 2020, para. 4; Naidu, 2021, paras 1, 13).

The content of what universities teach is also a cause for concern. The specialities and occupations that are most in demand currently did not exist in many countries and industries a decade ago. A popular estimate is that in the present day, as many as 65% of learners entering primary school will one day work in an occupation that does not yet exist (WEF, 2016, p. 3). It is essential to anticipate and prepare for the transition required by the present changes (WEF, 2016, p. 3). This transition requires an investment in resources to equip universities and retrain staff.

Even though universities require increased investment in resources to adapt to the changes brought about by technological disruption, universities worldwide are experiencing a decrease in government funding. These institutions have exponentially increased their Tuition Fees to keep to their standard Expense structure. Apart from the increased tuition charged by universities, enrolments globally are on the rise (Burer and Fethke, 2016, p. 182; Koornhof, 2020, para. 7; Mtshali, 2020, para. 19; Perović and Kosor, 2020, para. 516). Despite the increase in enrolments experienced by universities, these institutions did not benefit from Economies of Scale and have been privy to high cost rises over the last few decades, even though almost all industries have experienced a decrease in cost and increase in efficiency (Cooper, 2020, para. 14).

Disruption, decreasing funding, increasing enrolments, and the pressure to maintain the highest performance levels require of universities to ask how they can be operated more efficiently (Mojahedian *et al.*, 2020, p. 2). Universities need the thorough application of Management and Cost accounting to obtain relevant and accurate information to aid in their decision-making process to improve their efficiency. However, there exists a gap between the need for universities to apply Management and Cost accounting and the available knowledge on how to use it effectively in the diverse service setting of a university.

Higher education lagged in an economy where most industries benefited from technological advancements (Pathak and Palvia, 2021, p. 36). Over the past few decades, universities experienced substantial growth both in terms of Revenue and enrolments. However, the growth in enrolments, in a primarily fixed cost environment, should have led to improved efficiency and universities benefiting from Economies of Scale. In contrast, universities kept on increasing their Tuition Fees, indicating a possible lack of efficiency in managing their Expenses. This study aims to evaluate the reason for this phenomenon before disruption (2020) to use as a base to determine the possible impact of the future disruption universities globally face, since universities are currently in the eye of the storm. Online and open-source education providing access to the best universities in the world, the challenges of a decrease in the relevance of traditional university degrees, the need to curb constantly increasing Tuition Fees, and the urgency to restructure how content is delivered, indicate that critical and strategic thinking is required to assess modules and degrees presented, both in terms of the 'What' and the 'How'.

It seems unavoidable that the enrolments at most traditional universities will decrease significantly in the near future due to increased competition in terms of relevance and cheap international online education. According to Serfontein (2019, p. 175), there is a significant positive relationship (sig. = -.000** and r = 0.78) between the direct profit of a university module and the number of students enrolled in the module, making enrolments the strongest driver of profitability (as opposed to credits, NQF levels, funding weights and the related faculty). What happens when students can study more relevant modules for free at the best institutions in the world? What happens to universities, with the majority of their costs being fixed, if student numbers decline? How will these institutions cover their costs if their funding decreases significantly in an industry notorious for its slow pace of adapting to change? The answers lie in the effective application of Management and Cost accounting principles in this environment of diverse service delivery to increase the efficiency of these institutions.

1.3. Research objectives

1.3.1. Primary objective

The primary objective of this study was to apply Management and Cost accounting principles to assess the efficiency at South African universities as typical service organisations in a disruptive environment.

1.3.2. Secondary objectives

The secondary objectives of this study supported the achievement of the primary purpose stated above:

Theoretical secondary objectives:

- Explore the historical development and application of Management and Cost accounting in service organisations;
- Assess the disruption organisations are facing globally;
- Explore the application of Management and Cost accounting in universities, both globally and in South Africa.

Empirical secondary objectives:

- Apply the principles of Management and Cost accounting to assess the efficiency with which the sampled South African universities, from a financial and historical perspective, were managed by analysing the Financial Statements for a sample of universities for 2010, 2015 and 2019;

- Evaluate the performance of the Revenue streams of South African universities in terms of the Budgeted benchmark (related to Teaching Input Units (TIU[1]) and Teaching Output Units (TOU[2]) growth; see section 5.6.2.4.) from 2010 to 2019;
- Evaluate the performance of the Expense categories of South African universities in terms of the Budgeted benchmark (related to TIU and TOU growth) from 2010 to 2019;
- Determine the extent and significance of the relationship between TIU and TOU growth and the Difference between Actual and Budgeted Revenue and Expenses at South African universities.

1.4. Preliminary literature review

The introduction and background to this study highlighted the disruption universities are currently facing. Navigating this disruption requires decision-making at these institutions. Universities will have to apply Management and Cost accounting principles effectively to aid in their decision-making process. The literature framework of this study is the application of Management and Cost accounting principles in service organisations to provide relevant and accurate information to aid with the decision-making process. Applying Management and Cost accounting principles at service organisations is complex and literature providing guidance on this application is limited (refer to section 1.7.). Since universities are typically multi-product service organisations, subject to public regulation without a profit motive, using Management and Cost accounting principles at these organisations is no easy task (Nemoto and Furumatsu, 2014, p. 213).

Improved efficiency has become a vital tool in the survival of universities. Universities are experiencing increased levels of global competition to capture teaching and research talent and gain better ranking positions. These institutions also require

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[1] "A Full-Time-Equivalent Enrolment (FTE) that is weighed according to the funding grid as determined by the South African DHET" (Serfontein, 2019, p. 16).

[2] "A grant dependant on the actual total of non-research graduates as well as the normative total of non-research graduates as generated by a head count passed through the relevant weighting grid as determined by the South African DHET" (Serfontein, 2019, p. 16).

increased transparency and levels of accountability, but with decreasing resources. Management and Cost accounting allows increased efficiency regarding planning, decision-making, and control (Saladrigues and Tena, 2017, pp. 118–119). The efficiency brought about by implementing a Management and Cost accounting system is primarily thanks to the data produced by such a system (Saladrigues and Tena, 2017, p. 119).

1.4.1. Management and Cost accounting in service organisations

The Industrial Revolution and the development of a market economy that became competitive saw the birth of Management accounting, focusing primarily on cost analysis (Bufan, 2014; Tenhunen and Danielescu, 2018). Management and Cost accounting systems were initially developed for the costing of goods. Therefore, it is understandable that these systems might not be entirely applicable in the costing of services (Lowry, 1990, pp. 159, 176; Terzioglu and Chan, 2013, p. 30). However, the degree to which these systems are appropriate for application in the service industry, remains arguable according to documented literature, even though many of the rules applicable to the manufacturing environment also apply to non-manufacturing environments (Gripper, 1995, p. 2; Terzioglu and Chan, 2013, p. 30).

A vital factor considered in this study was that universities are service delivery organisations (Kamal Basha *et al.*, 2015, p. 173; Serfontein, 2019, p. 6). The application of Management and Cost accounting has a history of being viewed as a specified function in the manufacturing industry, and tends to place a lower emphasis on adopting mature Management and Cost accounting systems (Patil and Kshatriya, 2016, p. 47). Consequently, the service industry has not invested sufficient time and capital into developing applicable Management and Cost accounting systems (Gripper, 1995, p. 22).

One of the key factors differentiating manufacturing and service organisation outputs is intangibility. Intangibility complicates the accurate costing of a unit of service delivery output due to the difficulty of identifying one unit of output, the value of which is often dependent on the customer's perception (Terzioglu and Chan, 2013, p. 30). On the one hand, a manufacturing organisation can easily specify the parts (inputs) used in manufacturing one product (output). In contrast, a service organisation lacks such a clear input-output relationship, since the output (service) relies in differing measures on support activities (input). This differentiation could be challenging to pin down (Gripper, 1995, p. 27). The difficulties mentioned in measuring the cost of service outputs also complicate service organisations' control and financial monitoring (Terzioglu and Chan, 2013, p. 30). Service and manufacturing organisations can also differ from a costing perspective, since for a service organisation: a) costs are primarily period costs; b) measuring output is complex; and c) service organisations are mostly labour intensive, with most labour costs fixed in the short term (Terzioglu and Chan, 2013, p. 32).

The global market environment is also characterised by an increase in the portion of Indirect costs forming part of the total costs of delivering a cost objective (Hojna, 2013, p. 64; Terzioglu and Chan, 2013, p. 35). In addition to the general increase in Indirect costs, service organisations have relatively low levels of variable costs compared to fixed costs (Terzioglu and Chan, 2013, p. 33). It is also harder to separate costs into their variable and fixed components in service organisations. A further complication in identifying unique costs for individual services is the high occurrence of complementary products and Joint costs in service organisations (Terzioglu and Chan, 2013, p. 33). Applying Management and Cost accounting principles as a tool to provide relevant, accurate information for effective decision-making is highly complicated in service organisations.

1.4.2. Universities as service organisations

Universities deliver a service (refer to section 1.1.4.) and, therefore, face all the difficulties of applying Management and Cost accounting principles to service organisations. Adding to these difficulties is the fact that universities deliver a wide variety of services. Management and Cost accounting is a relatively new concept to universities, with very few traces of its application noticeable before mid-1980 (Saladrigues and Tena, 2017, p. 121). Cost accounting is further not mandatory for universities globally and, more specifically, departments at universities (Fabre, 2013, p. xiv).

The management accountant at a university carries the responsibility to continually ensure that the institution is financially healthy whilst addressing the challenges faced by universities. Failing to fulfil this task could result in a lack of financial sustainability (Cropper and Drury, 1996, para. 38). As early as 1996, Cropper and Drury (1996, para. 34) stated that:

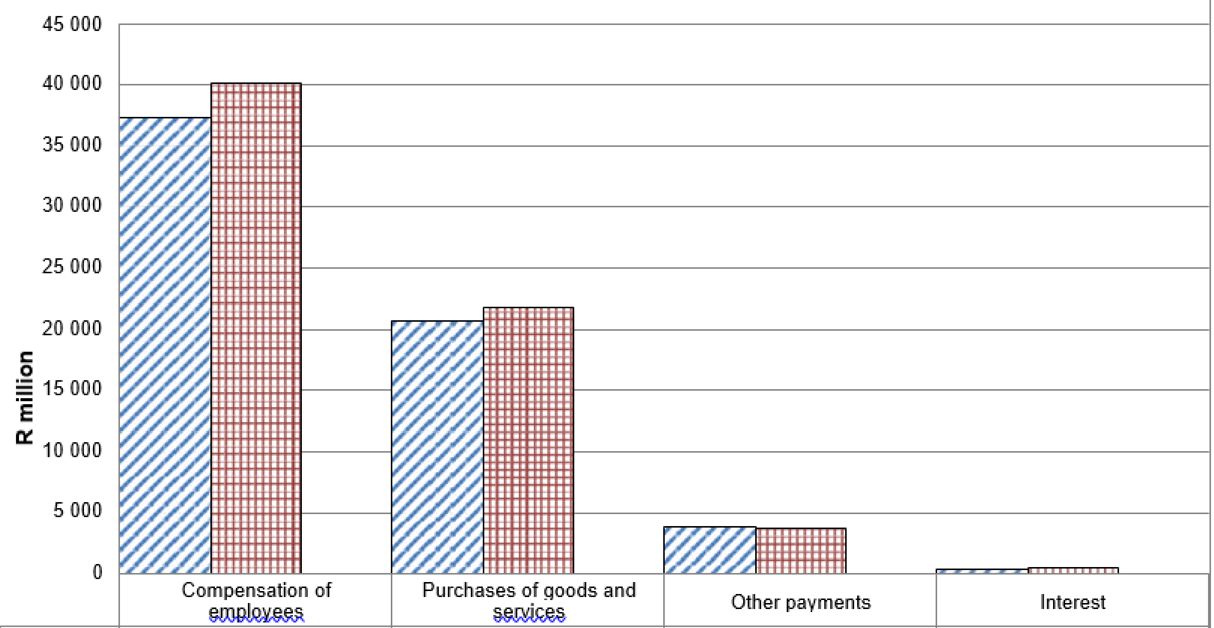
> *"Against a backdrop of a rapidly changing higher education sector, and ever-increasing pressure to extract maximum benefits from scarce resources, the management accountant has to develop new approaches in the provision of financial information."*

When considering a university as a service organisation, research has shown that most costs of universities are fixed. This creates an expectation that the cost per unit should decrease with enrolment increases (Moore, 1998, p. 76). Typically, most costs incurred in manufacturing or retail organisations are product or variable costs, characterised by a direct causal relationship to the product (output). In most service organisations, such as universities, this causal relationship is absent, constraining the application of conventional Management and Cost accounting principles (Serfontein, 2019, p. 11). Measuring the input-output relationship at universities is difficult, due to the unique nature of the service delivery processes at these organisations. Activities with differing natures are performed simultaneously at a university, meaning that resources are often shared amongst activities. An excellent example of shared resources is labour costs. Teaching and research staff are paid one salary (usually fixed) but perform activities to produce outputs on all three service streams (see section 4.2.) at the institution (Saladrigues and Tena, 2017, p. 120).

1.4.3. South African universities

When considering the cost structure of South African universities, Figure 1.3, published by Statistics South Africa (2019, p. 6), illustrates that Salaries comprised most of the university spending in South Africa for 2017 and 2018. Figure 1.3 demonstrates that South Africa's 26 public universities spent R40 billion (61%) on Salaries in 2018 and 60% in 2017 (Editorial, 2019c, para. 1). Since Salaries are paid monthly to permanent employees, they can be classified as a fixed cost.

Figure 1.3: Economic classification of Expense cash flows for operating activities for South African universities for the 2017 and 2018 financial years (R million)



	Compensation of employees	Purchases of goods and services	Other payments	Interest
2017	37 311	20 705	3 865	395
2018	40 085	21 806	3 652	459
Difference	2 774	1 101	-213	64

Source: Statistics South Africa (2019, p. 6).

It is clear from the behaviour of the biggest portion of the costs incurred by universities that an increase in student numbers should not necessarily lead to a rise in costs and accordingly cause an increase in the fees charged by universities. The cost structure and operation of universities was further investigated in the literature review of this study (see Chapter 4).

1.5. Methodology

1.5.1. Introduction

Research is performed in two stages. The first stage is an investigation into the current information in the related field of study. This investigation could bring forth new findings or, in a second stage, the existing theories discovered could be applied to arrive at new conclusions. Hence, research requires an understanding of the existing field of knowledge and then expanding that field (Goodchild, 2016, p. 26; Crous, 2017, p. 21). The two stages of research translate into a literature review and an empirical study.

Stage one of this research consisted of a literature review followed by a quantitative empirical study. This section will look at the research purpose, design, and methods of the study.

1.5.2. Research purpose

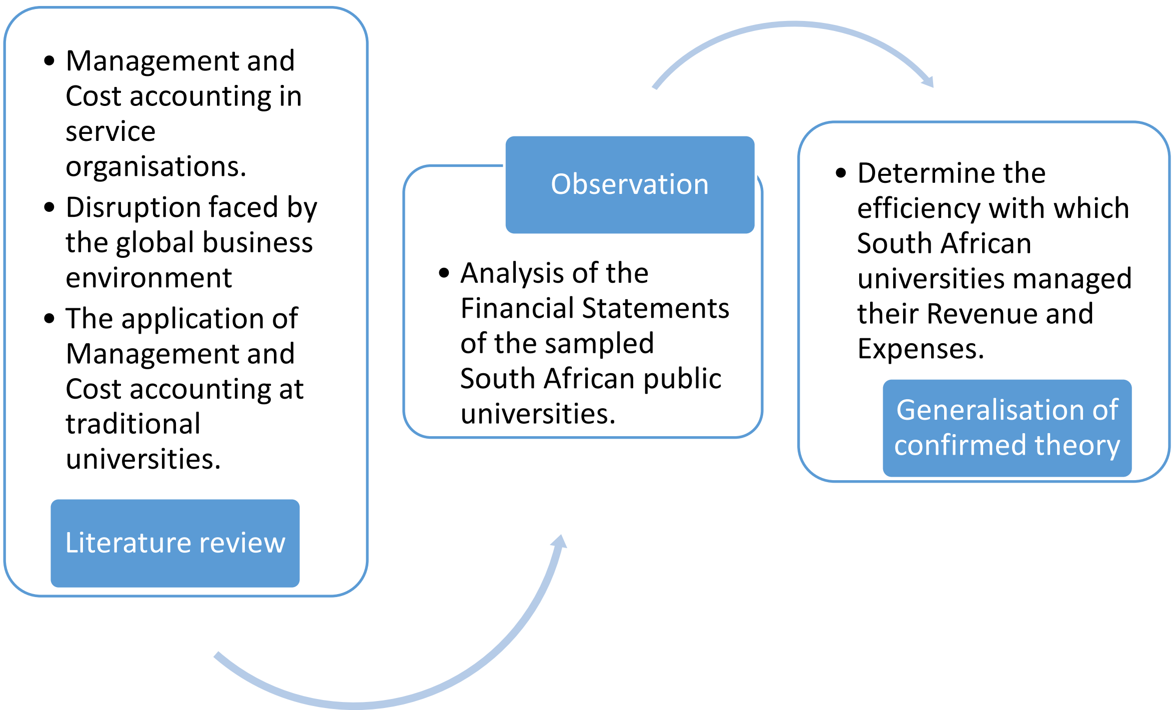
The purpose of this study was to perform exploratory research. The primary function of exploratory research is to formulate a problem for further investigation or explore a phenomenon to gain a new insight (Kothari, 2004, pp. 35–36; Van Zyl *et al.*, 2017, p. 7). The exploratory research applied in this study reviewed the existing literature surrounding the disruption universities face and the possible consequences of this disruption. The literature review also investigated how service organisations, specifically universities, applied Management and Cost accounting to manage disruption and achieve efficiency.

1.5.3. Research approach

Research can follow two distinct approaches, i.e. inductive, or deductive reasoning (Van Zyl *et al.*, 2017, p. 5). The research approach of this study was deductive reasoning. Deductive reasoning occurs when a conclusion is reached based on evidence from data on what is generally accepted as true or as an acknowledged general principle determined by literature. The start of deductive research is a solid theoretical base from which a problem statement can be derived. Observations will then be performed to support the theory. The confirmed theory can then be generalised (Van Zyl *et al.*, 2017, p. 8; Creswell *et al.*, 2019, p. 42). Based on the problem statement confirming the theory, the research is designed, and data gathered. The data collected are used to evaluate the problem statement, leading to explanations and identification of new problems.

Figure 1.4 depicts the deductive reasoning approach followed in this study as summarised by the researcher. The starting point here was the existing body of literature. The findings from the literature were observed by analysing the Financial Statement data of a sample of 16 of the 26 publicly funded universities in South Africa. These data were then analysed statistically to determine the level of efficiency with which universities managed their Revenue and Expenses.

Figure 1.4: Deductive reasoning approach followed



Source: Own.

1.5.4. Research design

The research design is "*a plan or blueprint of how you intend to conduct the research*" (Mouton, 2007, p. 55). The research design of this study was quantitative. Quantitative research is conducted in response to research questions that require numerical data and is primarily of a deductive nature (Van Zyl *et al.*, 2017, p. 11). A quantitative research design is when data in numbers are collected and analysed statistically (Bryman *et al.*, 2014, p. 41; Goodchild, 2016, p. 35). Quantitative research typically uses numerical data from a selected sample to generalise its findings to the population (Creswell *et al.*, 2019, p. 184).

The observation portion of this study revolved around numerical data from the Financial Statements of a sample of 16 of the 26 South African traditional universities. The data were analysed based on Management and Cost accounting principles to confirm the findings from the literature review. The data were then statistically evaluated, and the statistical analysis results applied to conclude on the cost efficiency of South African universities. Part of the statistical analysis was to evaluate the performance of the Revenue streams and Expense categories of South African universities in terms of the Budgeted benchmark related to TIU and TOU growth from 2010 to 2019. Finally, statistical analysis was also applied to determine the extent and significance of the relationship between TIU and TOU growth and the Difference between Actual and Budgeted Revenue and Expenses at the sampled universities.

1.5.5. Research method

The application of Management and Cost accounting can be challenging, especially since universities are service organisations. The literature review portion of this study reviewed the available literature to identify these challenges. The empirical part of this study made use of numeric data. The numeric data comprised the Financial Statements of a sample of 16 of the 26 publicly funded universities in South Africa for 2010, 2015 and 2019, which are secondary data in the public domain. The period of data collection was influenced by the duration of the study and the availability of data, as well as the impact of the COVID-19 pandemic.

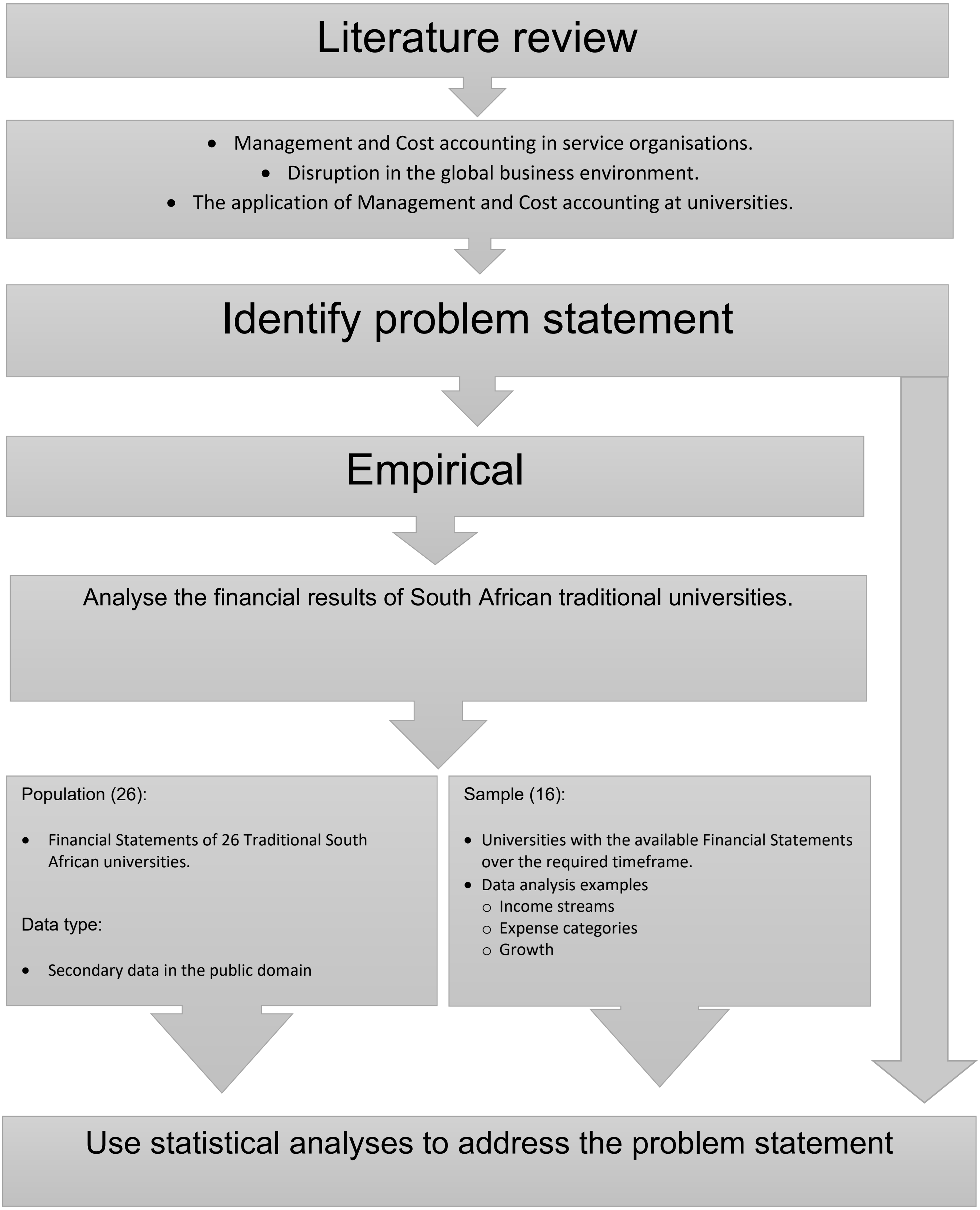
The financial data included in the Financial Statements of the 16 sampled universities of the population of 26 were analysed to establish the level of efficiency with which these institutions managed their Revenue and Expenses over the past nine years (2010–2019). The Financial Statements of 2020 were specifically not included, to ensure that the impact of COVID-19 does not distort the historical analysis of the financial data of universities. However, the disruption described in Chapter 3 includes future disruption (post-2019) that universities will face (and are even facing already). It is, therefore, even more important to ensure that the evaluation of the efficiency of universities is not affected by the current disruption to ensure that an accurate conclusion of the impact of the disruption based on the current efficiency of universities can be drawn. The financial analysis focused on the Revenue from the three Revenue streams (Subsidies and Grants, Tuition Fee Income, and Other Income) and three Expense categories (Academic Salaries, Other Salaries, and Other Expenses). These line items were analysed in terms of growth over the last nine years and average annual growth. The analysis also included the percentages of these line items in terms of Total Revenue and Total Expenses. Further analysis consisted of the growth of the line items over and above inflation and the growth in enrolments. The growth in enrolments is a critical element to use as a baseline for efficiency, since universities experienced significant growth in enrolments over the past few decades, but all indications are that the disruption discussed in this study will cause a decline in university enrolments. To understand how a decline in enrolments will impact universities, the effect of growth before the height of the disruption considered in this study affected universities must be considered, therefore Financial Statements from 2010 to 2019 were analysed specifically excluding 2020.

Part of the analysis of the financial data in terms of growth is an analysis of how efficiently universities managed their Revenue and Expenses by comparing the Actual amounts to the Budgeted amounts. The Budget was determined taking inflation and growth in enrolments into account. The sum of TIUs and TOUs (TIOUs) were used as a proxy for growth. Data on TIUs and TOUs are data in the public domain. TIUs and TOUs were specifically selected to determine the growth in enrolments, since these figures are weighted in terms of CESM and NQF levels, both variables taking cognisance of the fact that different programmes incur different Expense levels, which should impact the Tuition Fees charged for the related programmes.

Since the analysis of the Financial Statements was done in Excel, the researcher had to apply caution in ensuring that figures were captured accurately from the Financial Statements. One of the measures to ensure the accuracy of data captured was to build control figures into the spreadsheets that were compared to the total from the data captured. Another measure was to have a second person doing spot checks on the data and formulas used to ensure the validity of the calculations and accuracy of the data captured.

Figure 1.5, as created by the researcher, illustrates the quantitative exploratory research method followed in this study. The figure also provides a detailed roadmap on how the researcher designed the study to meet all the stated objectives.

Figure 1.5: The research diagram



Source: Own.

1.6. Ethical considerations

The researcher and one of the promotors on this study are Chartered Accountants and members of the South African Institute of Chartered Accountants (SAICA). SAICA holds all its members accountable to a very comprehensive Code of Professional Conduct. According to this code, all SAICA members should at all times act in the public interest (International Ethics Standards Board for Accountants, 2018, sec. 100.1 A1).

The data used in this study from a sample of 16 of the 26 South African public universities are available in the public domain. All data are already available, and no additional data were gathered. The researcher, however, acknowledged the sensitivity of the data and anonymised all universities included in this study.

This study was approved by the General/Human Research Ethics Committee (GHREC) of the University of the Free State. This approval depended on the adherence to all ethical standards as stipulated by the University of the Free State following all relevant laws and regulations.

1.7. Contribution of the study

The background to this study (refer to section 1.1.4.) highlighted the challenges of applying Management and Cost accounting principles to service organisations. Even more challenging is applying Management and Cost accounting to an organisation delivering a diversity of services such as a university. This study focused on applying Management and Cost accounting at universities to improve the efficiency of these institutions.

The literature in this study was based on two themes to identify the gap in the research. Firstly, the application of Management and Cost accounting in the service sector was explored. Next, the search was narrowed down to include universities as service organisations' application of Management and Cost accounting.

Some studies were found by the researcher that examined manufacturing organisations' cost structures but, as stated by Terzioglu and Chan (2013, pp. 29–30), despite the service industry's growth, the body of knowledge on the application of

Management and Cost accounting in service organisations remain limited. The difference in research quantity regarding costing services instead of the costing of goods is understandable, since costing practices were initially developed for manufacturing organisations (Terzioglu and Chan, 2013, p. 29; Mohr, 2017, p. 91). The researcher experienced that since 2013, there was no significant increase in the theory surrounding the application of Management and Cost accounting in service organisations.

However, studies that address Management and Cost accounting and services tend to focus on public sector organisations and evaluate systems already implemented, making a few suggestions on how the current system could be improved, but not necessarily applying Management and Cost accounting principles on an organisation-wide scale. One example of such a study is by Labrador and Olmo (2019, p. 407). In the study, the authors analysed the accounting systems of public sector organisations in Spain as prescribed by the relevant laws and regulations. Mohr (2015, p. 95) discussed the purpose of Management and Cost accounting in the public sector, but did not research how it should be applied. The focus of this study was narrowed down to universities as service delivery organisations. Management and Cost accounting in a university setting is relatively new and was about non-existent in mid-1980s (Saladrigues and Tena, 2017, p. 121).

Hans H. Jenny (1996, p. 1) notes that even though research on costing applications in organisations is vast, it focuses primarily on for-profit organisations. Where research has been focused on higher education, it is very diverse, addressing concerns relevant to the period of the related research like new funding frameworks or the implementation of costing systems. Universities still lack the tools to understand how their scarce resources are allocated. It appears as if costs at universities are in the eye of the beholder, depending on the person performing the costing (Jenny, 1996, p. 1). More recent studies attempting to navigate Management and Cost accounting at these complex organisations generally focus on implementing a Management and Cost accounting system at higher education institutions. Attempts to provide examples of the implementation of Management and Cost accounting methods are minimal (Sisa *et al.*, 2018, p. 280).

Where attempts were made to apply Management and Cost accounting principles at universities, the application focused on a single course or a department. The literature review for this study did not produce any research where Management and Cost accounting principles were applied to a university as a whole. In a study where breakeven was used in a higher education setting, the breakeven was only calculated for one course in medicine to compare web-based and face-to-face delivery of the course. The study was purely utilised to determine cost versus benefit of moving courses online (Maloney *et al.*, 2012, p. 237).

When considering the availability of research addressing the disruption caused by COVID-19 at universities, Rita McGrath, professor in Management at Columbia University, reiterates that data dealing with the uncertainty from a business point of view caused by COVID-19 do not exist and must be created (Amato, 2020b, p. 3).

It seems as if traditional South African universities, focusing primarily on face-to-face and on-campus teaching, might be losing their relevance, since online learning is here to stay. This study aimed to address the gap in theory surrounding the application of Management and Cost accounting at South African universities. It also went a step further and looked at where Management and Cost accounting principles can assist South African universities in addressing the challenges they are facing and regain their relevance by freeing up resources to make the required leap, both in capital investment and staff training, to a blended learning approach. Without this change in the business model of traditional universities, the available open-source education may cause the downfall of traditional universities.

1.8. Limitations and delineation

The main limitation of this study was the sensitivity of the information used. Even though universities are public institutions, managements are not overly willing to share financial information. Therefore, the study is limited to the Financial Statements available for the applicable fiscal years.

1.9. Chapter layout

This section provides a brief description of the layout of the chapters included in this dissertation.

Chapter 1: Introduction to study

Chapter 1 included the introduction and background of this study, expanding on the current challenges universities globally are confronted with. The background also focused on the difficulties experienced with applying Management and Cost accounting in service organisations. It further included the primary and secondary objectives and a sample literature review. Chapter 1 also included a description of the methodology followed in conducting this research to fulfil the stated objectives, and addressed how the study contributed to the existing body of knowledge on applying Management and Cost accounting at universities as service organisations.

Chapter 2: Management and Cost accounting in service organisations

This chapter is the first literature review chapter to the study. The literature review in Chapter 2 centres on applying Management and Cost accounting at service organisations. This literature review includes the challenges faced in applying Management and Cost accounting principles to an organisation, providing intangible cost objectives without a clear input-output relationship. These challenges are even more severe at universities that deliver a diverse range of services. Part of the investigation of this chapter are the difficulties of cutting costs in service organisations due to the high amount of fixed costs, indicating a higher risk environment.

Chapter 3: Disruption faced by the global business environment

In Chapter 3, the disruption that businesses globally are experiencing are explored. The exploration focuses on the efficiency as well as the relevance of traditional universities. The impact of COVID-19 expediting the 4IR, including the resulting increase in unemployment rates, forms part of this chapter. The review in this chapter could assist in predicting the variables that could change for universities in the near future.

Chapter 4: The application of Management and Cost accounting at universities

The literature that the researcher reviews in Chapter 4 shifts the focus of Management and Cost accounting application to universities. Management and Cost accounting application is challenging in service organisations, but even more challenging where an organisation delivers a wide range of services like universities delivering teaching, research and activities generating Third-stream Income.

Chapter 5: Methodology

The fifth chapter provides a detailed discussion of the research purpose, design and method followed in this study. This chapter includes the data collection methods and a description of the financial and statistical analysis tools that the study utilised.

Chapter 6: Empirical analysis and results

Chapter 6 of this study includes the financial analysis of the Financial Statements of the 16 sampled traditional universities in South Africa. The results of the financial analysis are also statistically evaluated to answer the research problem derived from the literature review.

Chapter 7: Conclusions and recommendations

This is the final and concluding chapter of the related research. The conclusion includes a summary of the findings from the literature review and the empirical part of the study. This chapter also contains recommendations the researcher derived from the study, where applicable. The limitations of the research and possible future research opportunities form part of Chapter 7.

1.10. Summary

Universities are on the brink of substantial disruption. COVID-19 and the expediting of the 4IR are some disruptions universities are already confronted with. This is both exciting and nerve-wracking. Most industries have benefited from the technological advancements brought on by the 4IR, but this does not seem to be the case with higher education institutions. Instead, these institutions have seen a steady increase in costs (primarily discretionary fixed costs) with a decline in Income. Universities' enrolments have kept increasing, regardless of the concerns surrounding the relevance of university education to ensure employability. The question, however, remains what the future holds for universities, with the most considerable portion of their costs consisting of fixed costs, if enrolments should start to decline?

Universities must adapt or face the consequences. The next three chapters of this study investigate the application of Management and Cost accounting at service organisations and, more specifically, universities. The literature reviewed further considers the disruption organisations, and specifically universities globally, are facing.

The literature review is followed by the empirical part of the study that analyses the financial information of a sample of the publicly funded universities in South Africa from 2010 to 2019 (using Financial Statements for 2010, 2015 and 2019). The findings from the analysis of the financial information provide insight into the impact of the disruption reviewed through studying the available literature on disruption as well as how the application of Management and Cost accounting at universities can be used as a tool to manage this impact.

Chapter 2 – Management and Cost accounting and service organisations

2.1. An introduction to Management and Cost accounting

Providing accurate, timely and detailed Management accounting information remains a high priority for organisations to stay competitive in the modern business environment (Askarany, Smith and Yazdifar, 2007, p. 53; Wnuk-pel, 2010, p. 8). Even more so for universities that are at a crossroads. Applying Management and Cost accounting at universities could be the key to providing management with critical information to ensure financial sustainability (Serfontein and Smit, 2021, pp. 180, 184).

Organisations use Management and Cost accounting tools to accumulate and measure cost data to enable the analysis and interpretation of the data to aid in both external as well as internal decision-making (Sulaiman, Ramli and Mitchell, 2008, p. 62; Fabre, 2013, p. xx; Persaud, 2020, p. 3). However, Management and Cost accounting also comprises more than just the application of tools to generate information; it also includes the skills and role of the management accountant. The role of a management accountant ranges from being purely a provider of information to interpreting the data and, finally, being the decision-maker within an organisation (Sulaiman *et al.*, 2008, p. 62).

Management and Cost accounting in the current business environment has three main functions. The first is to allocate costs between the cost of goods sold and inventory for internal and external reporting purposes. Secondly, Management and Cost accounting provides relevant information to aid in decision-making. The final function of Management and Cost accounting is to provide information to help organisations in their planning, control, and performance management functions to assist with continuous improvement (Drury, 2018, p. 16).

To fully understand the application of all three Management and Cost accounting functions, an explanation of specific cost terms and concepts is required. However, these terms and concepts are discussed by using a generic cost objective. The term *cost objective* must be clarified, since it is a term that is often used throughout this chapter. The cost objective is the starting point to understanding different cost terms and concepts. According to Drury (2018, p. 22), a cost objective (often referred to as a cost object) is "*any activity for which a separate measurement of cost is desired*". In simpler terms, anything that a cost calculation is required for is defined as a cost objective. The main characteristic of the cost objective delivered by a service organisation is intangibility. Therefore, the vital cost terms and concepts used in this study are explained from an intangible cost objective perspective.

This chapter focuses on the changes that characterise the modern business environment to address the gap between the available literature on Management and Cost accounting and the tools required to operate organisations efficiently in the modern business environment. From the perspective of these changes, conventional Management and Cost accounting tools are discussed, focusing specifically on explaining a causal input-output relationship.

Understanding the meaning of a causal input-output relationship is critical once the chapter shifts its focus to service organisations and applying Management and Cost accounting tools in the service industry. As explained by the widely applied conventional Budgeting practices (refer to section 2.5.5), the service industry is at risk of not using relevant Management and Cost accounting tools. Conventional Budgeting as a central Management and Cost accounting tool is also discussed. The criticisms against conventional Budgeting set the tone for explaining the importance of efficiency and Economies of Scale. Typically, the organisations with a cost structure that will benefit from Economies of Scale are also more exposed to risk, which is discussed later.

The final part of the discussion in this chapter, before modern solutions to the problems explained are investigated, is the management of Overheads (Indirect costs). The chapter concludes with a look at more modern Management and Cost accounting practices, again focusing on modern Budgeting models. These tools are discussed to address the shortcomings of conventional Management and Cost accounting practices under certain circumstances.

2.2. Development of Management and Cost accounting

Management and Cost accounting has its formal origin in the industrial revolution of the nineteenth century, even though it had existed as one of the oldest managerial tools, dating back to ancient times, with records of accountants to Pharaoh 3 000 years before Christ (Adum, 2015, p. 1884). The nineteenth century is often regarded as the "*costing renaissance*" and is characterised by the emergence of large business enterprises, including iron and still works and textile mills. All these enterprises extensively used machinery in their industrial production processes. During the nineteenth century, vital Management and Cost accounting developments took place, during which time most of the tools used today originated (Adum, 2015, p. 1884).

Cost accounting systems in 1910 provided information relevant to various decisions affecting product differentiation and efficiency. The engineers working in the factories developed this 1910 system to assign costs to product lines and products (Adum, 2015, pp. 1889–1890). Since the 1910s, the focus shifted from purely costing products and product lines towards the concept of different costs for different purposes. This shift resulted from technological advancement in modern business. In 2013, various authors commented on the constant decrease in the number of jobs in the manufacturing environment over the preceding 40 years (Chand and Ambardar, 2013; Oesch and Baumann, 2013, p. 101). Organisations thus had to change their focus from Management and Cost accounting application purely for cost allocation to decision-making (Adum, 2015, p. 1891).

Adum (2015, p. 1895) expands on the specific changes that organisations resorted to. This includes advanced manufacturing technologies, robotics, flexible manufacturing systems and computer-aided designs. These changes resulted in a repositioning of manufacturing activities and changing the behaviour patterns of the related manufacturing costs (Adum, 2015, p. 1896). All the changes mentioned increased the pressure on organisations to improve their operations' quality and efficiency, focusing on customer satisfaction (Adum, 2015, p. 1895).

During the 1980s, conventional Cost accounting systems were criticised for becoming obsolete and not being able to fulfil the Management and Cost accounting objectives in the new production environments (Adum, 2015, p. 1892). Despite factors coming into play that encouraged the modernisation of Management and Cost accounting, it is a field that has seen very few modifications in the available tools, practices, and principles (Guerreiro, Frezatti and Pereira, 2006, p. 1).

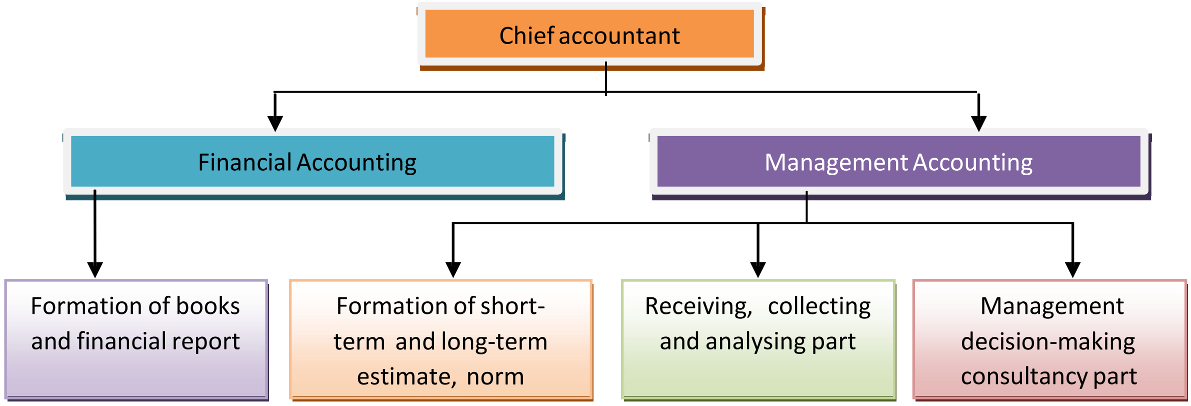
Management and Cost accounting has developed into an important system, with tools to calculate the cost and determine the prices of products and services, with its most important function to provide information to aid in the decision-making process (Adum, 2015, p. 1885; Tu *et al.*, 2019, p. 8; Glomazic, 2020, p. 82). Management and Cost accounting has received accolades as an effective tool to improve the quality of outputs, managing the organisation, maximising the planned results in an organisation, mobilising the decision-making processes of management, as well as an effective measure to control risks (Tu *et al.*, 2019, p. 8). It is, however, essential to note that organisations apply Management and Cost accounting to provide information for internal management, not necessarily external financial reporting (Tu *et al.*, 2019, p. 2). From an internal management perspective, Management and Cost accounting analyses the profitability and costs of cost objectives to improve efficiency, production, and maximising profits (Tu *et al.*, 2019, p. 2).

2.2.1. Management and Cost accounting versus Financial accounting

In 1988 Robert Kaplan, one of the founding fathers of modern-day Cost accounting, expressed concerns regarding managers of organisations basing their decisions primarily on Financial accounting figures, most often used for external reporting (Moore, 1998, p. 42). Financial accounting is not sufficient for providing information for decision-making, and Kaplan therefore made mention of the need for a "*separate, simplified Management accounting system*" to aid with management's decision-making role (Moore, 1998, p. 43).

Management and Cost accounting aids with management's decision-making role since it is an accounting system that focuses on providing information for internal reporting purposes based on forecasts of the future. The information provided by the Management and Cost accounting systems is reported without any legal requirements and is not based on generally accepted accounting practices. Internal reporting can take place as frequently as management requires. Financial reporting is a legal requirement focusing on reporting historical information for parties external to the business to fulfil the organisation's legal requirements based on generally accepted accounting practices (Drury, 2018, p. 6). However, in most organisations, these functions are integrated. Tu *et al.* (2019, p. 10) present Figure 2.1 to illustrate how these two areas can be integrated in an organisation.

Figure 2.1: Integrated management and cost and financial accounting functions



Source: Tu *et al.* (2019, p. 10).

From Figure 2.1, the Chief accountant oversees both Financial and Management accounting functions. These two functions are integrated when it comes to the evaluation the financial results of an organisation. Financial accounting reports the results according to statutory requirements and Management accounting reports on the financial performance based on predetermined norms, aiding in the decision-making process.

According to Cook (2003, p. 5) in 2003 already, the accounting profession highlighted the lack of relevant information for decision-making purposes provided by financial reporting systems. Other outcries were that information supplied by conventional accounting systems was dysfunctional, distorted, and inadequate (Cook, 2003, p. 5; Cokins, 2006, p. 74). These outcries necessitated the development of a Management and Cost accounting system, since it is an important tool for management in the provision of accurate and timely information for decision-making, as opposed to the lack of relevant information provided by Financial accounting systems (Oduoza, 2009, p. 136).

Management and Cost accounting tools that could aid in the provision of information for decision-making include Cost, Volume, Profit (CVP) analysis, breakeven analysis, and relevant costing (Persaud, 2020, p. 3). These tools rely on an understanding of cost (activity) drivers and cost behaviour and structure (Persaud, 2020, p. 3). For this study, a cost driver will be seen as any factor that triggers a cost, causing a change in an activity's overall cost (Persaud, 2020, p. 3). To further understand the field of Management and Cost accounting, it is imperative to understand the different cost structures related to Management and Cost accounting, how costs are calculated, classified, and how costs behave.

2.3. Cost structures

The calculation of the cost of a cost objective is probably the most critical function of Management and Cost accounting (Glomazic, 2020, p. 84). However, the determination and allocation of costs to cost objectives are complicated. Together with advances in technology and the accountant's ability, this complication means that organisations apply various cost recognition and classification methods (Tu *et al.*, 2019, p. 3).

The cost recognition and classification method applied in an organisation depends on the specific organisation's cost structure. The cost structure of an organisation refers to the ratio of fixed to variable costs incurred, which can affect its performance (Persaud, 2020, p. 4). Therefore, it is crucial to investigate the various costs forming part of the cost structure of an organisation. Understanding the cost structure of an organisation is a critical element of calculating the cost of a cost objective.

2.3.1. Calculation of costs

The calculation of costs involves a two-stage process. Firstly, costs are allocated to appropriate cost centres, utilising resource cost drivers, after which the costs are traced to the cost objective (Drury, 2018, pp. 49–50; Glomazic, 2020, p. 85). A cost centre is a responsibility centre where costs are incurred to enable a function or activity to be performed (Drury, 2018, p. 410; Glomazic, 2020, p. 85). A cost centre is a segment of an organisation that incurs costs but does not directly contribute to the Revenue of the organisation (Glomazic, 2020, p. 85). Cost drivers are any activity or operational part of an organisation that causes a cost to transpire. Ultimately, products or services form the main drivers of costs (Glomazic, 2020, p. 84).

At this point, it is important to emphasise that Cost accounting applied in manufacturing organisations differs from Cost accounting used in service organisations as a result of the fact that in service organisations, *"(a) almost all costs are period costs* (refer to section 2.3.2.2.)*; (b) the output is difficult to measure; and (c) service industries are typically labour intensive with most of the labour fixed, at least in the short term"* (Terzioglu and Chan, 2013, p. 32). These characteristics describing a service organisation complicate how costs are classified and could limit the relevance of conventional Management and Cost accounting tools.

2.3.2. Cost classification

Understanding and identifying the appropriate classification of different cost and Income types are central to calculating and managing costs. Even though the researcher used Financial Statements in the empirical portion of this study not necessarily classifying costs as extensively as described in this section, a detailed understanding of the different costs and behaviour of these costs is essential to determine what the costs should've been in order to effectively measure the efficiency with which these costs were managed. The appropriate classification of cost and Income items (cost classification) will enable sound decision-making by managers in managing business and production in an organisation (Tu *et al.*, 2019, p. 12). Cost classification entails identifying appropriate and useful ways to classify costs (and Income, but for ease of understanding the different classifications are discussed only from a cost perspective in this section). Cost classification depends on the needs of managers and the intended purpose for which the costs will be used. Since each basis for cost classification will provide information for a different purpose, the term "*different costs for different purposes*" becomes relevant (Tu *et al.*, 2019, p. 12). Organisations use various bases to classify costs. This section discusses a few of the bases relevant to this study.

2.3.2.1. Operational function classification

When costs are classified based on their operational function, they are split into production and non-production costs. Classification by operational function assists managers in building cost estimates, which in turn aid the evaluation of cost fluctuations. The analysis of cost fluctuations provides the information to control costs (Tu *et al.*, 2019, p. 112).

2.3.2.2. Cost classification by Financial Statement relation

When costs are classified by Financial Statement relation, it typically entails classification as either product or period costs. This form of classification illustrates how costs move through the different stages of the production process (Tu *et al.*, 2019, p. 13). Most of the costs incurred in service organisations are not specifically related to the cost objective and, therefore, not assigned to the cost objective (product cost) but reported in the period in which it was incurred (period cost) (Terzioglu and Chan, 2013, p. 32; Drury, 2018, pp. 26–27). Therefore, distinguishing between period and product costs becomes less relevant in service organisations (Terzioglu and Chan, 2013, p. 33).

2.3.2.3. Decision-making classifications of costs

One form of cost classification is specifically designed to assist managers in decision-making. This form of classification is where costs are classified as relevant (also termed incremental or differential) or irrelevant. Relevant costs include opportunity costs and irrelevant costs include sunk costs (Tu *et al.*, 2019, p. 13). Each of these terms are explained in more detail in this section.

A relevant cost will be incurred in the future and differs between the options under consideration (Hansen, Mowen and Guan, 2009, p. 636; Gean and Gean, 2016, p. 42). A relevant cost is also called a differential cost, since it differs between the options considered and is therefore incremental (avoidable), since this cost will be incurred in the future but can be avoided based on the decisions taken by management (Chatfield and Neilson, 1983, p. 387; Smit, 1989, p. 44). Relevant costs include opportunity costs (Chatfield and Neilson, 1983, p. 387; Smit, 1989, p. 44). Opportunity costs refer to "*the* *best alternative foregone by choosing one option over another*" (Chatfield and Neilson, 1983, p. 387; Drury, 2018, p. 33).

Irrelevant costs are, therefore, unavoidable, committed, or sunk costs. When decisions made by management will not affect the incurrence of a cost, the cost is irrelevant (Chatfield and Neilson, 1983, pp. 386–387; Drury, 2018, pp. 32–33). When a cost is incurred regardless of the decision taken, it is a committed cost that cannot be avoided by choosing a different option (Chatfield and Neilson, 1983, p. 387; Drury, 2018, p. 32). A sunk cost will not be affected by any decision taken at present or in the future, since the cost is related to a decision taken in the past, which makes sunk costs irrelevant (Chatfield and Neilson, 1983, p. 386; Drury, 2018, p. 32).

2.3.2.4. Direct versus Indirect costs

An appropriate cost calculation method should allocate Direct and Indirect costs to the cost objective (Glomazic, 2020, p. 85). Direct costs are costs that can be directly traced to the cost objective. Direct costs establish different products the moment they are incurred (Dowless, 2007, p. 53; Reider, 2008, p. 4; Dima, 2013, p. 17). Indirect costs (often referred to as Overhead costs, depending on the cost objective) are those costs incurred by organisations that cannot be traced directly to the cost objective. Indirect costs require an allocation method to determine the cost objective's cost. Therefore, Indirect costs are all the costs needed to produce the cost objective, apart from direct materials and direct labour (Dowless, 2007, p. 53; Reider, 2008, p. 4; Dima, 2013, p. 17; Glomazic, 2020, p. 85). Indirect costs refer to a wide variety of diverse costs that do not contribute directly to the service delivery process since Indirect costs can be manufacturing (production) or non-manufacturing (non-production) costs (Smit, 1989, p. 3; Drury, 2018, p. 63). Non-manufacturing Indirect costs are period costs, making it unnecessary to allocate these costs to the cost objective whereas, for financial accounting purposes, all manufacturing costs (Direct and Indirect) are allocated to the cost objective (product cost) (Drury, 2018, p. 63). Indirect costs are also termed Overheads in related literature.

2.3.2.5. Classification of costs by behaviour

The behaviour of a cost indicates how sensitive the cost is to a change in the level of a related activity (i.e. production or sales volume) (Persaud, 2020, p. 4). Classification of cost by behaviour typically entails classifying costs as either variable, fixed or mixed. The behaviour of costs assists managers in understanding the nature of cost variances, contributing to cost control (Tu *et al.*, 2019, p. 13).

A variable cost is a cost that is incurred every time an activity is performed. Examples include direct materials and direct labour. Thus, variable costs change in direct relation to a change in activity levels. These costs will be constant per unit, but will vary in total, increasing with an increase in activity level (Persaud, 2020, p. 4).

In contrast, fixed costs are costs that are incurred regardless of whether an activity took place or not. As long as the organisation remains in business, these costs will be incurred. Fixed costs usually do not have an impact, at least not in the short to medium term, on the decisions made by an organisation if the organisation operates within the relevant range (normal operating levels) and no additional fixed costs are incurred. Fixed costs remain constant in total for a period of time but will vary per unit, decreasing per unit as the related activity level increases, which is also one of the core principles of Economies of Scale (Persaud, 2020, p. 4). A further classification based on behaviour is mixed costs. A mixed cost contains both a variable and a fixed component (Banker *et al.*, 2018, p. 189).

Cost classification of fixed, variable, and mixed is referred to as conventional cost classification, but fails to establish the role decisions made by management play to influence said behaviour (Banker *et al.*, 2018, p. 189). According to Cooper and Kaplan (1992, p. 1), an increase in activity does not necessarily increase the resources required for that activity. Likewise, a decrease in activity does not equal an automatic reduction in unused capacity. Managers need to make a conscious decision to adjust resources based on activity (Cooper and Kaplan, 1992, p. 2; Banker *et al.*, 2018, p. 189). When the behaviour of costs is influenced by management's decisions, the cost of the related activity often becomes an exercise of approximation (Banker *et al.*, 2018, p. 189). Noreen and Soderstrom (1997, p. 89) state that this approximation will "*grossly overstate*" the relevant Overhead costs for both the decision-making and performance management functions of Management and Cost accounting (see section 2.1.).

One example of a cost influenced by the decision of an organisation's management team is direct labour cost. Direct labour cost is not necessarily fixed or variable. Direct labour may be variable in the United States, where workers can be laid off at the manager's will, or fixed like in Western Europe, where an immediate decision by an employer cannot simply lay off workers (Banker *et al.*, 2018, p. 190). Firm-specific conditions like training costs or union contracts might also influence the behaviour of direct labour costs (Banker, Byzalov and Chen, 2013, p. 126).

A further cause for specific behaviour patterns is the decision of managers to commit resources to constraints within a specific context (Banker *et al.*, 2018, p. 190). According to Anderson *et al.* (2013, p. 48) organisations are more likely to increase their costs directly to an increase in sales than decrease their costs as their sales decrease, leading to the asymmetric behaviour of costs (Anderson, Banker and Janakiraman, 2003, p. 48). One of the leading causes of this asymmetric behaviour of costs is labour adjustment costs due to managerial discretion in response to changing demand by adjusting resources (Golden, Mashruwala and Pevzner, 2020, p. 45). Literature terms these costs as "*sticky costs*", specifically referring to costs where "*the magnitude of the increase in costs associated with an increase in volume is greater than the magnitude of the decrease in costs associated with an equivalent decrease in volume*" (Anderson *et al.*, 2003, p. 48). According to Banker *et al.* (2013, p. 190), managers do not explicitly choose costs to be sticky, variable, or fixed.

2.3.2.6. Joint costs

Another term that indicates a form of cost classification is Joint costs. Joint costs are the costs incurred to produce more than one output type from the same input (Terzioglu and Chan, 2013, p. 34). A high value of Joint costs complicates identifying an input-output relationship in any organisation (see section 2.4.3.) (Terzioglu and Chan, 2013, p. 34).

Allocating Joint costs to cost objectives is best described as "*arbitrary*", which means that an organisation with a high amount of Joint costs will struggle to determine the cost of an individual cost objective. The high presence of Joint costs in service organisations reiterates the difficulty in determining a causal input-output relationship (Terzioglu and Chan, 2013, p. 34). The lack of a causal input-output relationship makes classifying costs as either variable or fixed very challenging.

As described in this section, the appropriate classification of costs is the starting point to applying Management and Cost accounting tools. Some of the tools available to organisations to manage their costs are briefly discussed in the next section.

2.4. Application of Management and Cost accounting in service organisations

Section 2.2. of this chapter investigated how the business environment is changing. This section explores the changing business environment further with a specific focus on how these changes affect the application of Management and Cost accounting systems in organisations.

2.4.1. Technological changes and changes in cost due to mechanisation

The modern business environment is characterised by technological advances leading to globalisation, increasing the competitiveness in which organisations do business (Chand and Ambardar, 2013; Lale and Andelokovic, 2014; Odar *et al.*, 2015; Rudawska and Belyaeva, 2018). Advancements in technology are further responsible for manufacturing automation, causing a consistent decrease in the available jobs in manufacturing (Oesch and Baumann, 2013, p. 101). Automation is influenced and advanced by the onslaught of the 4IR, which includes block-chain, 3D-printing, the Internet of Things (IoT) and AI, to mention but a few (Yang *et al.*, 2018, p. 4). Globalisation forced organisations to move to a flexible business model, focusing on horizontal instead of vertical structures with multifunctional teams and decentralised profit structures (Lale and Andelokovic, 2014, p. 169). This globalisation and increased competition, mechanisation of production, and a change in the structuring of the pricing of cost objectives meant that the amount of Overheads incurred by organisations increased drastically in proportion to direct labour and materials (Cooper and Kaplan, 1988; Smit, 1989; Tolsma, 1996, pp. 8–9; Hojna, 2013, p. 64; Bazrafshan and Karamshahi, 2017, p. 164).

In addition to the increase in the proportion of total costs consisting of Overheads, direct labour decreased to as low as between five and nine per cent of the total production costs incurred by an organisation (Cooper and Kaplan, 1988; Smit, 1989; Tolsma, 1996). The cost structure of organisations therefore moved from primarily variable and Direct to primarily fixed and Indirect. Due to this move, contemporary business and operations technologies revealed that conventional costing systems are no longer appropriate. This revelation encouraged an increased understanding of costing systems to enable newer costing systems to be developed. These systems should incorporate Target and Lifecycle Costing and Activity-Based Costing (ABC) (Chenhall and Moers, 2015, p. 8).

Apart from the changes in how the business environment functions and the cost structures of modern organisations, the modern business environment saw an increase in the number of service organisations (Editorial, 2020e, para. 1, 2020c, para. 1). However, as explained in the next section, service organisations require a different Management and Cost accounting system.

2.4.2. Service organisations

Economic trends moved from selling goods and providing spare parts towards providing service solutions customised for the client’s need, indicating the importance of service cost in the total Lifecycle cost of a product or service (Huang, Newnes and Parry, 2012, p. 417). The service industry increased from a contribution of 61.71% to global GDP in 2010 to 64.34% in 2019, with manufacturing decreasing from a contribution of 16.66% to global GDP in 2010 to 15.57% in 2019 (Editorial, 2020e, para. 1, 2020c, para. 1). It is thus evident that service organisations are crucial to the economy of any country (Kamal Basha *et al.*, 2015, pp. 173–174). However, conventional accounting systems cannot meet the needs of service organisations since they ignore the *“flourishing investments and Expenses in an organisation’s service function*s” that support the development of a separate Cost accounting system for service organisations (Terzioglu and Chan, 2013, p. 32).

Decision-making at service organisations is complicated due to managers' doubt about the accuracy of the costing data provided to assist with the decision-making process (Terzioglu and Chan, 2013, p. 30). One of the reasons for this doubt in the accuracy of cost data is because costing systems were initially developed for the costing of goods and might not be completely applicable in the costing of services (Lowry, 1990, pp. 159, 176; Terzioglu and Chan, 2013, p. 30). Additionally, most costs incurred in service organisations are fixed by nature. It further becomes harder to separate costs into variable and fixed components in service organisations (Terzioglu and Chan, 2013, p. 33).

Typically, most costs incurred in a manufacturing or retail organisation are variable or product costs. These costs are incurred with a direct causal relationship to the produced output (cost objective). These characteristics of a manufacturing or retail organisation make the application of variable costing and Budgeting relevant and the results accurate. However, where there is an absence of a direct or causal input-output relationship, as in most service organisations, conventional Management and Cost accounting tools are limited (Serfontein, 2019, p. 11). Conventional Management and Cost accounting practices were predominantly designed to manage Direct and variable costs (Cooper and Kaplan, 1988; Smit, 1989; Tolsma, 1996, pp. 8–9; Hojna, 2013, p. 64; Adum, 2015, pp. 1889–1890; Bazrafshan and Karamshahi, 2017, p. 164).

The appropriateness of costing systems to cost services remains a point of contention in documented literature (Terzioglu and Chan, 2013, p. 30). Terzioglu and Chan (2013, p. 32) ask whether all the differences between manufacturing and service organisation outputs warrant a separate system to cost services. Even though management control systems could generally be applied in service and manufacturing organisations with very little differentiation, Cost accounting principles cannot. One of the main reasons for not being able to apply universal Cost accounting principles in service organisations is the vast differences between the production processes used at service organisations as well as the difficulty governing the application of tools to control costs and calculate profitability in service organisations (Terzioglu and Chan, 2013, p. 32).

The main reason for the difficulty in using cost control tools and calculating profit in service organisations is that service organisations face a severe challenge when trying to define a clear input-output relationship (Serfontein, 2019, p. 8). One of the reasons for the difficulties experienced by service organisations in costing their cost objective is the complexity of defining one unit of service output compared to how easy the definition of one unit of output is in manufacturing organisations (Gripper, 1995, p. 26; Terzioglu and Chan, 2013, p. 30). Part of the difficulty in defining a unit of service output is output diversity, referring to service organisations delivering cost objectives with the service as the output relying on differing measures of support activities (Gripper, 1995, p. 27). What is clear is that the Management and Cost accounting applied in service organisations cannot be identical to the Management and Cost accounting applied in manufacturing organisations (Terzioglu and Chan, 2013, p. 32).

2.4.3. Conventional input-output relationship

When considering a cost objective, the cost objective is the output achieved by a combination of various inputs. The cost of a unit of output indicates the resources consumed in producing the output (Moore, 1998, p. 76). For example, the estimation of product costs includes determining the cost of producing and selling a physical good, like a motor vehicle. These manufacturing costs include research and development costs, design, manufacturing, distribution, and customer service costs (Huang *et al.*, 2012, p. 418). The cost objective delivered by service organisations is characterised by intangibility, heterogeneity, perishability and the inseparability of production and consumption (Kamal Basha *et al.*, 2015, pp. 173–174). Intangibility is the main separating factor between the cost objective delivered by manufacturing organisations and service organisations. The tangible nature of the output produced by manufacturing organisations means these organisations have minimal difficulty in identifying the different resources (inputs) used in delivering one unit of output. One output unit can use many resources (parts in a manufacturing organisation); another output unit could use less resources (Gripper, 1995, p. 27). In contrast, service organisations produce a cost objective that involves the provision of support activities (input) in differing measures. This means that a large portion of the input costs involved in providing a service is not explicitly related to the provision of the service (Gripper, 1995, p. 27; Terzioglu and Chan, 2013, p. 32; Drury, 2018, pp. 26–27).

The differences between manufacturing and service organisations mentioned above mean that no clear causal relationship exists between the inputs required to provide a service (output) in service organisations. This input-output relationship is more causal and direct in manufacturing organisations. When comparing service and manufacturing organisations, this difference in the relationship between inputs and outputs is an important factor driving how costs are classified (Serfontein, 2019, p. 9). This difference is due to the challenge service organisations face in separating costs into fixed and variable components (Terzioglu and Chan, 2013, p. 34).

Service organisations cannot apply the same Management and Cost accounting principles as manufacturing organisations. Manufacturing organisations can still apply conventional Management and Cost accounting principles effectively, but these principles must be reconsidered when service organisations are taken into account.

2.5. Conventional Management and Cost accounting tools

Various Management and Cost accounting tools are available to manage costs in an organisation. These tools can include more conventional techniques such as Standard and Absorption costing used in calculating the cost objective's cost and calculating variances from a planned standard. According to Rao and Bargerstock (2011, p. 49), over 70% of the organisations that participated in a survey by the Institute of Management Accountants (IMA) and Ernst and Young (EY) indicated that, regardless of the changing business environment, they still implemented more traditional Management and Cost accounting tools, including Absorption costing and Overhead allocation.

The primary aim of these tools in the manufacturing industry is to determine the value of inventory (Patil and Kshatriya, 2016, p. 47). However, the changes in the business environment as discussed in section 2.2. and expanded on in Chapter 3 will continue to shape the nature of Management and Cost accounting. Managers in this field should continue to adapt to these changes to ensure that all the relevant information for decision-making is supplied as required (Adum, 2015, p. 1896).

2.5.1. Absorption costing

Absorption costing is widely applied in strategic cost management (Patil and Kshatriya, 2016, p. 47). Hojna and Stryckova (2018, p. 20) classify Absorption costing as a more conventional Management and Cost accounting tool. Absorption costing charges Expenses incurred to cost objectives as either manufacturing, administrative or sales Overheads (Indirect costs) (Patil and Kshatriya, 2016, p. 47). Absorption costing's main aim is to ensure that production costs include Direct and Indirect (Overhead) costs (Hojna and Stryckova, 2018, p. 19).

The allocation of Direct costs to cost objectives is usually a straightforward task. Determining the amount of Indirect costs that should form part of the cost of a cost objective is more complicated than determining the Direct cost and involves the apportionment and allocation of the Indirect costs (Hojna and Stryckova, 2018, p. 19). Volume-based drivers are usually used to charge Overheads to the cost objective (Patil and Kshatriya, 2016, p. 47). The use of volume-based drivers could decrease the accuracy of the cost calculation where the cost incurred is not necessarily volume-driven, leading to incorrect decisions (Hojna and Stryckova, 2018, p. 20). A further complication is that the incorrect cost calculation of a cost objective also affects the value of inventory (unsold cost objectives).

In the service industry, very little statutory guidance exists in inventory valuation. It is therefore possible that the same information is used to value inventory, determine profitability, and to make decisions. This lack of costing guidance in service organisations often leads to incorrect decisions (Patil and Kshatriya, 2016, p. 47). Service organisations, therefore, frequently use more modern tools to manage costs, including Customer profitability analysis, ABC strategically, Lifecycle Costing and Target costing (see section 2.8. for a discussion on modern Management and Cost accounting tools) (Patil and Kshatriya, 2016, p. 47; Hojna and Stryckova, 2018, p. 20). The formulation of an Absorption costing system in an organisation is based on a Standard costing model (Hojna & Stryckova, 2018, p. 21).

2.5.2. Standard costing

Standard costing is classified as a conventional cost accounting tool (Fałat, 2020, p. 97). During the 1920s, Standard costing variance analysis was welcomed as a new, innovative production control measure (Bargerstock and Shi, 2016, p. 40). Since the 1920s, Standard costing has been applied globally in manufacturing and service organisations to control production costs and efficiency (Bargerstock and Shi, 2016, p. 40; Fałat, 2020, p. 98). Primarily, Standard costing is applied to exercise cost control. Standard costing is also applied to evaluate the performance of an organisation, costing inventories, pricing products, preparing Budgets, and facilitating management decision-making (Fałat, 2020, p. 97).

According to Falat (2020, p. 97), some academics have suggested that Standard costing is no longer a suitable tool to value output in the global competitive business environment. One of the reasons supplied for the lost relevance of Standard costing, especially as a tool to support decision-making, is that the portion of total costs consisting of Overhead costs are increasing in organisations operating in the modern business environment (see section 2.4.1.) (Paul and Cokins, 2020, p. 34). This increase in Overheads could decrease the accuracy of Standard costs, since more errors could occur when trying to apportion Indirect costs to products using volume-based drivers (as is often the case in Standard costing) (Paul and Cokins, 2020, p. 34).

Standard costing works from planned bases (standards) to calculate the Direct and Indirect costs of the cost objective (Fałat, 2020, p. 97). A Standard costing system requires establishing Budgeted amounts of output supported by Standard costs and quantities for inputs. Standard input costs consist of labour, material, and production Overheads (Bargerstock and Shi, 2016, p. 40). After establishing a Standard cost per unit, the actual costs incurred are calculated. Variances between actual costs incurred and the standard set are calculated. These variances are particularly helpful in the control of cost (Rao and Bargerstock, 2011, p. 48; Bargerstock and Shi, 2016, p. 42).

2.5.3. Dealing with variances

Standard costing allows management to conduct in-depth analyses of each type of product cost (Fałat, 2020, p. 98). Four types of variances are present when applying Standard costing variance analysis, i.e. production variances, inventory adjustments, currency variances and purchase price variances (Fałat, 2020, p. 99). These variances can be favourable or unfavourable (adverse). The identification of adverse variances creates an opportunity for a conversation with production personnel to identify and rectify, where necessary, the causes of these variances (Bargerstock and Shi, 2016, p. 42). Variance analysis allows improvements to be implemented to avoid future adverse variances (Fałat, 2020, p. 100).

The managerial control available through the implementation of variance analysis is often criticised since variance reports are sometimes prepared weeks after the actual operations and occur at aggregated levels, making the cause-and-effect connections difficult to establish (Bargerstock & Shi, 2016, p. 42). A further criticism against a Standard costing system is the detailed accounting and recording of every transaction to enable tracing the process flow through the various stages of production. This is easy to maintain in an environment where a single product is produced. However, in the modern business environment where product differentiation and a focus on customer satisfaction take centre stage, the volumes of variance reports that will be produced may not be able to produce any meaningful information to aid in the exercise of managerial control (Rao and Bargerstock, 2011, p. 48). Even though Standard costing and the resulting variance analysis have been deemed irrelevant in the modern business environment, it is still widely used in manufacturing organisations worldwide (Rao and Bargerstock, 2011, p. 49).

2.5.4. Cost, Volume, Profit analysis (CVP)

One basis on which management decisions are made is analysing the relationship between cost, volume and profit. Decisions based on CVP analysis include setting selling prices that will maximise profits and how product quality can be improved to satisfy client needs by changing the variable input cost of a product. A further benefit of CVP analysis is setting the optimal production volume to optimise machine usage and maximise profits (Tu *et al.*, 2019, p. 14). The relationship between cost, volume and profit is primarily expressed in breakeven point analysis. Breakeven point analysis aids an organisation in determining the profitability of changing the volume of cost objectives produced. It could also assist an organisation in determining the volume of cost objectives required to realise the expected return (Tu *et al.*, 2019, p. 14).

CVP analysis functions are based on a Contribution Income Statement. Utilising a Contribution Income Statement requires that the costs incurred by an organisation are classified according to their behaviour (i.e. variable or fixed). A contribution margin is calculated by deducting all variable costs from sales Revenue. The profit for the organisation is determined after fixed costs have been deducted from the contribution margin (Persaud, 2020, p. 4). The approach where an organisation splits incurred costs between its variable and fixed components is the foundation for CVP and breakeven analysis (Persaud, 2020, p. 4). Accordingly, CVP and breakeven analysis provide managers with valuable information in their decision-making tasks (Persaud, 2020, p. 11).

The final Management and Cost accounting tool considered in this study is Budgeting. Budgeting is an essential tool for managerial control in organisations. However, it is a practice becoming outdated, considering the changes faced by the business environment (Liyanage and Gooneratne, 2021, p. 28). The following section explains why a conventional approach to Budgeting warrants reconsidering.

2.5.5. Conventional Budgeting

"*Budgets are formalized plans of management's objectives*" (Raghunandan, Ramgulam and Raghunandan-Mohammed, 2012, p. 111). Over the past few decades, according to authors Liyanage and Gooneratne (2021, p. 28), Budgeting remained a cornerstone for managerial control in organisations and remains one of the most frequently used Management and Cost accounting tools (Pietrzak, 2013, p. 26). A Budget has three distinct purposes: a) forecasting (planning and coordination); b) target setting (motivation and evaluation of employees); and c) resource allocation (Pietrzak, 2013, p. 26; Bogsnes, 2020, para. 11). Part of efficiently managing the costs of an organisation is to effectively plan the activities in the related organisation which requires the use of Budgets. Measuring the cost efficiency at an organisation also requires the comparison between the plan (Budget) and the actual results.

When considering conventional Budgeting it entails setting standards, recording actual results, and finally comparing the actual outcomes with the planned outcomes. Any variances are identified and remedied, where required (Liyanage and Gooneratne, 2021, p. 28). In an environment with little or no causal relationship between inputs and outputs, as is the case with service delivery organisations and an environment with a high amount of Overhead costs, Budgeting may be less effective.

The Budgets of organisations in a service environment are typically incremental and discretionary (Raghunandan *et al.*, 2012, p. 114). Incremental Budgets are the most widely used Budgets in public sector organisations (Ortynsky, Marshall and Mou, 2021, p. 76). Incremental Budgets adjust the existing Budgeted allowance for an organisation’s current activities for changes like expected growth or inflation (Drury, 2018, p. 386). As an internal reporting tool, the Budget preparation process in any organisation is vital to enhance the managerial function (Glomazic, 2020, p. 91). However, conventional Budgeting has been on the receiving end of many criticisms (Liyanage and Gooneratne, 2021, p. 27).

2.5.5.1. Criticism against conventional Budgeting

Criticism against the conventional approach to Budgeting includes that it is costly and time-consuming, rigid and a fixed exercise that occurs annually. Conventional Budgeting further entails bureaucratic management, often inhibiting organisations from adapting to change, not focusing on strategy or competitors (Pietrzak, 2013, pp. 26–27; Liyanage and Gooneratne, 2021, p. 27). When considering incremental Budgeting as a widely used conventional Budgeting model, the main criticism against incremental Budgeting is that it encourages incremental thinking and not consideration of the justification of spending (Drury, 2018, p. 391). These criticisms make conventional Budgeting of limited use in the modern business environment that consists of global competition, is highly volatile and competitive, with shortened product lifecycles and rapid advances in technology (Liyanage and Gooneratne, 2021, p. 28). However, despite the many criticisms against Budgeting, it remains an essential practice in business (Pietrzak, 2013, p. 27).

Considering the criticism against Budgeting, a practice termed "*Better Budgeting*" is suggested. Better Budgeting aims to improve Budgeting and planning processes instead of "*Beyond Budgeting*", a practice aimed at departing from conventional Budgeting practices (Pietrzak, 2013, p. 26; Liyanage and Gooneratne, 2021, p. 27). Better Budgeting is aimed at enhancing the focus and accuracy of Budgetary outputs striving to provide a balance between flexibility and control. Improved Budgeting practices that are described by Better Budgeting include Zero-Based Budgeting (ZBB), Rolling Forecasts (Budgets) and Activity-Based Budgeting (ABB) (refer to section 2.9.) (Liyanage and Gooneratne, 2021, p. 28).

Beyond Budgeting aims to completely abandon the practice of setting Budgets claiming that Budgets are inherently flawed. Beyond Budgeting involves decentralised decision-making with adaptive management models, with a high trust placed on employees to promote self-governing units within an organisation (Liyanage and Gooneratne, 2021, p. 28). Modern Budgeting practices are discussed in section 2.9. Effective Budgeting practices can aid an organisation in improving its efficiency by assisting in planning its operations. Specifically in an environment where fixed costs are high with almost no causal input-output relationship, such as service organisations, Incremental Budgeting is often used, however, Incremental Budgets do not consider the efficiency of costs every year since cost are only incrementally increased by expected changes in selected variables.

2.6. The drive towards efficiency and Economies of Scale

According to Charnes, Cooper and Rhodes (1978, p. 430), supported by Kudla, Stachowiak-Kudla and Figurski (2016, p. 95), efficiency is achieved with maximisation of the relationship of weighted outputs to weighted inputs of a decision-making unit. In different terms, efficiency is measured by determining whether stated goals were met with the resources employed (Perović and Kosor, 2020, p. 517). One specific model developed in the late 1970s, Data Envelopment Analysis (DEA), was used to measure efficiency by assigning predetermined weights to inputs and outputs (Mojahedian *et al.*, 2020, p. 2; Perović and Kosor, 2020, p. 518). Per the DEA model, the unit with the highest performance achieves the highest output with the lowest input. The highest performing unit now becomes the reference in determining the other units' efficiency (Mojahedian *et al.*, 2020, p. 2).

The DEA model also serves as an allocation method for Joint costs (section 2.3.2.6.) to address the possible shortcomings of more conventional methods. DEA uses linear programming to determine the weights that should be applied to allocate resources based on maximising the ratio of weighted output to weighted input (Salerno, 2006, p. 286).

> *"In short, DEA seeks to maximize each institution's productivity by identifying a set of weights that puts it in the best possible light relative to all other institutions being evaluated"* (Salerno, 2006, p. 286).

When the input cost of a related output is decreased, it is a sign of improved efficiency. When this decrease results from a production increase, the organisation has achieved Economies of Scale.

2.6.1. Economies of Scale

Different definitions exist for Economies of Scale. The definition of Economies of Scale included in the *Merriam-Webster Dictionary* is:

> *"a reduction in the cost of producing something (such as a car or unit of electricity) brought about by especially the increased size of production facilities"* (Merriam-Webster.com, no date, para. 1).

Kenton (2021; para. 1) expands on this definition by stating: Economies of Scale *"are cost advantages reaped by companies when production becomes efficient"* (Kenton, 2021, para. 1).

Therefore, Economies of Scale can be achieved when organisations increase their production whilst lowering costs. The reason behind attaining Economies of Scale is that costs (both variable and fixed, refer to section 2.3.2.5.) are covered by a more significant number of cost objects (Kenton, 2021, para. 1). A further observation where Economies of Scale are present is when managers increase their skill and specialisation and, therefore, complete the tasks assigned to them more efficiently as the organisation grows (Altuntas, Berry-Stölzle and Cummins, 2021, p. 815). Thus, Economies of Scale are present when the proportion of outputs produced from the proportion of inputs equals or exceeds one (Lewis and Dundar, 1995, p. 3; Nemoto and Furumatsu, 2014, p. 216). To simplify, Economies of Scale are present where there is a decline in the cost per unit of output with an increase in the volume of output units produced (Altuntas *et al.*, 2021, p. 815). This is specifically achieved in organisations with high period or fixed costs, because, although the fixed costs remain the same for the period, it declines per unit, typically as in service organisations.

Economies of Scale are achieved when the unit cost decreases with increased output. This is typical behaviour for a fixed cost (section 2.3.2.5.). However, in a cost structure where fixed costs are higher than variable costs, there is less elasticity. This means that when production decreases, costs will not necessarily decrease in relation to the decrease in production. A cost structure with a high proportion of fixed costs exposes an organisation to risk since the organisation will not straightaway be able to decrease the costs they incur as required with an associated decrease in sales Revenue (Bhojraj *et al.*, 2021, p. 80).

2.6.2. Risk

An organisation can be exposed to various types of risk. The focus of this study is, however, on financial risk. Holzhacker, Krishnan and Mahlendorf (2015, p. 2306) define financial risk as the potential an organisation faces of being unable to cover its required financial obligations. In other words, if two organisations are the same size and operate at a similar operational scale, the organisation with the most considerable portion of total costs made up of committed resources is exposed to higher risk (Holzhacker *et al.*, 2015, p. 2309). The large portion of committed resources implies that organisations cannot easily decrease their spending in a period of contraction (Bhojraj *et al.*, 2021, p. 80).

Organisations with relatively high levels of total cost comprising committed resources, have a less elastic cost structure. An organisation with a less elastic cost structure (typically with high fixed costs) is at a higher risk, specifically if Revenue declines (Holzhacker *et al.*, 2015, p. 2306; Bhojraj *et al.*, 2021, p. 80). A less elastic cost structure implies that most of the costs are fixed or period costs, which will not spontaneously decline when Revenue declines (Holzhacker *et al.*, 2015, p. 2306).

Most service organisations, such as universities, benefit substantially while Revenue increases, but suffers financially when Revenue declines. The disproportionate changes in profits as opposed to sales are also referred to as operating leverage and are directly linked to the level of fixed cost. A high operating leverage therefore indicates a high risk that organisations might not cover their costs (Drury, 2018, p. 184). Operating leverage brings a new understanding of risk.

One of the most prominent characteristics of the modern business environment causing traditional Management and Cost accounting practices to be questioned is the notable increase in Overhead costs (Paul and Cokins, 2020, p. 34). This increase is one factor influencing the elasticity of organisations and, consequently, their risk exposure. Therefore, it is essential to understand the impact of Overhead costs on the efficiency of organisations before a relevant discussion of modern Management and Cost accounting practices can occur effectively. The next part of this chapter discusses the concept of Overhead cost in more detail.

2.7. Overheads

The complexity of the management task resulted in the growing importance of the management of Overhead costs in the cost structures of organisations, not only because of the rapidly changing external environment, but also technological development and automation. Since the 1980s, scientific studies have established that, internationally, Overhead costs have relatively increased and represent a significant part of total costs, especially in service organisations (Moore, 1998, p. 14; Terzioglu and Chan, 2013, p. 35). Mechanization and technology could partly explain the growth in Overhead costs. As organisations use technology, the Direct cost associated with delivering services and products are declining, leading to an increase in Overhead costs; hence the nature of many costs changed from variable and Direct to Indirect and fixed (Cooper and Kaplan, 1988; Smit, 1989; Tolsma, 1996, pp. 8–9; Hojna, 2013, p. 64; Bazrafshan and Karamshahi, 2017, p. 164).

The increase in the Overhead costs incurred by organisations is a cause for concern, especially for service organisations. For service organisations, one of the most challenging tasks for Management and Cost accounting is the allocation of fixed Overheads to the cost objective (service unit) (Terzioglu and Chan, 2013, p. 35).

The extent and relative escalation of Overheads necessitate management to address the control and productivity of Overhead functions in a similar manner as Direct costs. From the perspective of Overhead costs, Smit (1989, p. 419) documented a few noteworthy criticisms against existing management practices. Firstly, most Management and Cost accounting systems focus primarily on Direct costs. The next criticism is that Overhead allocation is subjective and arbitrary and allocates Overheads away from the control centre. Focusing on Budgeting, a concern regarding the management of Overheads is that Budgets are primarily applied for financial planning and cost control, and at best addresses the input costs for discretionary Overheads. The final criticism noted by Smit is that the techniques to increase productivity are seldom applied to Overhead functions and when it is applied to these functions, it is informal and indirect. These observations from Smit (1989, p. 419) in 1989 remains true today since Overheads keep on rising as literature confirms, especially in service organisations where there is limited causality between inputs and outputs (Cooper and Kaplan, 1988; Smit, 1989; Tolsma, 1996, pp. 8–9; Moore, 1998, p. 14; Hojna, 2013, p. 64; Terzioglu and Chan, 2013, p. 35; Bazrafshan and Karamshahi, 2017, p. 164).

Adding to the complexity of Overhead allocation is the diversity of services delivered. The calculation of the cost of a non-standard service often occurs only after the delivery of the service (except if a quotation is required) (Terzioglu and Chan, 2013, p. 32). Typically, a firm with a higher proportion of committed fixed costs (costs that cannot be readily reduced in the short term) has a smaller chance of breaking even (Persaud, 2020, p. 4).

2.7.1. Committed versus discretionary Indirect costs

One of the important discussions in the 1980s was about committed versus discretionary Indirect costs (Smit, 1989, p. 3). A discretionary Indirect cost is usually fixed, diverse and without a clear causal relationship between the cost and the output or the goals of an organisation (typically staff- and service function costs) (Smit, 1989, p. 3). A discretionary cost can be influenced by the discretion of the management team of an organisation but is not necessary for maintaining capacity (Smit, 1989, p. 3; Drury, 2018, p. 395). A committed cost is a cost that will be incurred in the future based on the decisions not controlled by management’s actions. Committed Indirect costs also refer to essential costs if the organisation wants to maintain its capacity in the near future, such as depreciation on equipment in a manufacturing environment. Committed costs are characterised by an underlying legal obligation to make payments regardless of management's action on the short term horizon (Balachandran, Ronen and Radhakrishnan, 1996, pp. 239–240). Other examples of committed Indirect costs include interest on outstanding debt or contracted lease/rental payments for plant and machinery (Balachandran *et al.*, 1996, pp. 239–240).

Discretionary, non-manufacturing Overheads are fixed for a period of time and refer to the corporate management and general administration costs and the cost of staff (Salaries) and service functions. The unique characteristics of discretionary Overheads are that these costs are usually Indirect and fixed. In the short to medium term, it cannot be changed or influenced by decisions top management takes and is very diverse (Drury, 2018, pp. 410–411). More importantly, there is no clear causal relationship between these costs and the cost objective of an organisation (Smit, 1989, p. 3).

According to Huijben, Geurtsen and Van Helden (2014, p. 27), very little research has been done in the few years leading up to their paper in 2014 to address this topic, and the researcher, therefore, relied on an older source deemed still relevant for insight on this topic. There are various difficulties with the management and control of Overhead costs. According to Smit (1989, p. 208–220), there are several reasons for the lack of management and control of Overheads, which is the reason for the substantial ongoing increases in Overheads experienced over multiple business sectors. Apart from the lack of an input-output relationship in service organisations, as mentioned previously, the following reason for the Overhead problem is that the productivity of Overhead activities is not easily measured (Smit, 1989, p. 211). One example in support of this problem is that management can easily prove the necessity of their role but struggle to prove the productivity of the various tasks they are required to perform. The same goes for service personnel. Service personnel does not often have an effective scale to measure productivity (Smit, 1989, p. 211; Hirsh, Bevan and Barber, 1995, p. 56; Down, 2019, para. 8). Research and development are further examples where a lot of work can be performed to create an effective design that might not be economically viable.

The next reason Smit (1989, p. 211) provides for the Overhead problem is the lack of goal congruence between the main objective of the organisation as a whole and the objectives of a service department. A service department needs to prove its usefulness. This is often accomplished by taking on tasks that could easily have been outsourced, leading to the generation of work for the related service department that the organisation does not necessarily need and could probably have gone without. This situation is aggravated by managerial promotions being dependent on the number of personnel managed by the candidate and the relative operating Budget size under the candidate's control (Aggarwal, 1983, p. 28). A decrease in spending of the candidate's department is interpreted as inefficiency or neglect of essential functions (Aggarwal, 1983, p. 28). The outcome of this excessive increase in the workload of service departments is that these departments often aim to appoint specialists in their discipline to ensure that the work remains an internal function. A further problem that is classified under this heading is the multiplier effect. Here organisations simply keep on attaching new activities to their established operations. Merely improving operations when an overthrow of how things have always been done is required, adds to organisations' lack of goal congruence (Kantrow, 1986, p. 96).

The levels of management is another factor adding to the Overhead problem (Smit, 1989, p. 214). As time progresses and organisations expand, more levels of management are created. One reason for these increased levels of management is decentralisation. Consequently, a service department is often created at head office and in the decentralised unit (like an accounting department). The outcome of these doubly created service departments is that managers are so busy writing reports and delivering presentations to head office that line management takes a back seat (Smit, 1989, p. 214). A range and number of positions are created at top management level instead of increasing line function employees (Smit, 1989, p. 214). Another reason for the increases in levels of management is that organisations often create a new department in reaction to a problem that needs to be solved. Once the problem is solved, the newly created management level remains, since organisations are often hesitant to phase out this management level for fear of causing frustration or that it could lead to retrenching certain staff specialists (Smit, 1989, p. 215). The more control these managers then obtain, the more they reward themselves, causing exponential Overhead increases (Aggarwal, 1983, p. 26).

The underutilisation of expensive equipment is another reason for the Overhead problem (Smit, 1989, p. 2015). This underutilisation problem can be related to office automation and computer development for service organisations. Automation and computers should've cut administrative costs. This does, however, not seem to be the case. So many costs were spent on complex computer equipment, but productivity justifying the cost did not necessarily increase (Smit, 1989, p. 216). One example of this excessive investment in high-priced equipment is establishing a research- and development department with expensive equipment. Often organisations establish such a department purely because a competitor has it, not necessarily to find improved production methods (Kantrow, 1986, p. 99). These increases in administrative technology could also result from an excessive need for information, becoming a goal in itself for many organisations (Smit, 1989, p. 216).

Smit (1989, p. 217) provides four more reasons for the excessive Overhead cost increase. Firstly, fast-growing organisations often experience Overhead problems. These problems are usually a result of growth due to the lack of cost-consciousness. When the demand for output increases, organisations increase Overheads in the form of more services and facilities, which in itself is not a problem, but becomes a problem when sales and, accordingly, output starts decreasing (Smit, 1989, p. 217).

A move towards a more bureaucratic management style is the following possible reason for problems with Overhead control (Smit, 1989, p. 217). Bureaucracies have as a main advantage very formal organisational structures, providing instructions for employees. This is also the main criticism against these structures since more emphasis is placed on support and staff functions to keep these structures in place. This, accordingly, provides more decision-making power to existing centralised functions (such as finance and planning), increasing the number of personnel required in these departments (Smit, 1989, p. 218).

The inability of accounting systems to accommodate Overheads sensibly also leads to increases in these costs (Smit, 1989, p. 218). Control over Overhead costs is complicated by oversimplified and arbitrary allocations of Overheads to cost objectives, mostly away from the source. An allocated cost cannot be controlled by the department it is allocated to.

Top management's attitude towards Overheads is the final cause of Overhead problems (Smit, 1989, p. 219). Various Overhead activities are poorly managed because these functions are often the favourites of top management (Smit, 1989, p. 219).

Overheads ordinarily make up a significant portion of a service organisation's total cost, making it essential to allocate these costs accurately by identifying the correct cost drivers (Terzioglu and Chan, 2013, p. 35). According to Deloitte's 2019 global cost survey, controllable (discretionary) Expenses account for 50% to 60% of non-manufacturing costs (Elliot *et al.*, 2019, para. 1). Discretionary Expenses provide a major opportunity to improve an organisation's efficiency by reducing costs without reducing customer value (Elliot *et al.*, 2019, para. 1).

An important note from Smit (1989, p. 219) is that the problem with Overheads, as described in this section, primarily resides within the discretionary component of these costs. The discretionary component here relates mainly to Salaries and related costs. These costs reside within the service or staff functions. In literature, the term most often used to refer to these functions are Selling, General and Admin Costs, or SG&A costs (see section 2.8.1.) (Paul and Cokins, 2020, p. 36).

To increase the productivity and control of discretionary Overheads, the following conditions must be met (Smit, 1989, p. 419):

- A service can only be evaluated based on the results or outputs delivered by the service;
- For each service, there must be a person or persons that benefit from the service in such a way that it is to the advantage of the business as a whole;
- The cost of the service must be in proportion to the benefit received; and

- The advantage or value of the service is evaluated best by the user of the service.

The lack of literature available on the management of Overheads, as well as recent studies highlighting the increase in Overheads, suggests that current management practices do not address the control and productivity of discretionary Overhead functions according to the conditions stated above (Cooper and Kaplan, 1988; Smit, 1989; Tolsma, 1996, pp. 8–9; Moore, 1998, p. 14; Hojna, 2013, p. 64; Terzioglu and Chan, 2013, p. 35; Bazrafshan and Karamshahi, 2017, p. 164). Therefore, the researcher draws the conclusion that the extent and escalation of Overheads in the modern business environment are to a great degree due to the poor management of Overhead functions.

The first part of this chapter explained the changes in the modern business environment. These changes can be summarised into two components. Firstly, there is a notable increase in Overhead (Indirect) costs for both manufacturing and service organisations (Huijben *et al.*, 2014, p. 27). The second significant change is a global increase in the number of service organisations, as noted by the increase in the contribution of service organisations to the global GDP (Serfontein, 2019, p. 6). From the first part of this study, it is clear that conventional Management and Cost accounting tools are not sufficient to address the changes noted in the modern business environment. This problem is highlighted in service organisations, since cost information, like cost drivers and changes in activities, is often lacking in these organisations, because standard operating procedures do not require sophisticated costing systems (Maguire and Rouse, 2004, pp. 64–65). The second part of this chapter focuses on investigating modern Management and Cost accounting tools in reaction to outdated conventional tools.

2.8. Modern Management and Cost accounting tools

In a service organisation, there is a clear lack of an input-output relationship (refer to section 2.4.3.). Still, sales volume (measured by using Revenue) drives SG&A costs (Anderson *et al.*, 2003, p. 48). SG&A is a term used in literature to describe all Overhead costs not related to sustaining the manufacturing process like quality insurance, material handling, apportioned plant management, equipment setup and maintenance, utilities insurance, and product inspection (Paul and Cokins, 2020, p. 36). Hence, in the service industry, where most input costs are fixed, improving financial viability to become more efficient warrants a focus on the behaviour of SG&A costs, which are classified as Indirect costs (Overheads).

2.8.1. Selling, general and administration (SG&A) costs

Decisions surrounding SG&A activities are bordered by unique challenges (Hawke *et al.*, 2020, para. 1). To ensure organisations have sufficient support in facing the challenges mentioned in the background of this study (see section 1.1.) as well as the ability to recover from the impact of COVID-19, they will require greater flexibility in financial as well as operational terms (Agrawal and Jochim, 2020, para. 4). For organisations to become more flexible, they need to preserve cash in the present and prepare to invest skilfully for the future (Agrawal and Jochim, 2020, para. 4). The need for flexibility has led Chief Financial Officers (CFOs) to reimagine their management of SG&A activities to avail opportunities to realign their spending (Agrawal and Jochim, 2020, para. 5). After the 2008 economic downturn, the organisations that acted the fastest to create flexibility in their Balance Sheet also acted faster than their peers at the first signs of recovery (Agrawal and Jochim, 2020, para. 7).

McKinsey & Company suggests three stages to ensure that SG&A expenditure is at an acceptable level, not just where it has always been, namely: a) improve spend visibility, b) Budgeting, and c) resource reallocation (Agrawal and Jochim, 2020, para. 25). Often, decision-makers do not truly understand what their organisations really spend their resources on. The cause for this lack of understanding is partially a result of Enterprise Resource Planning Systems (ERPs) and, in some cases, the reluctance of the responsible employees (cost centre owners) to share details on SG&A. Improved reporting on SG&A expenditure company wide, however, will open dialogues between managers and the responsible employees, leading to better trade-offs and choices. Visibility entails both forward- and backward-looking. Forward-looking visibility ensures that managers can improve their decision-making before the spending occurs. Looking backwards by comparing Actual and Budgeted Expenses, for example, provides a better understanding of any Budget deviations (Agrawal and

Jochim, 2020, para. 25). When deviations from the Budget is understood, managers will better be able to develop future spending plans (Agrawal and Jochim, 2020, paras 25–26).

Basic improved visibility could entail defining standard templates and tools for forecasting. This will simplify comparison across functions and even geographies. Where there exists consistent application of these developed forecasting tools and templates, setting simple key performance indicators could enable decision-makers to ask questions and identify outliers. Asking questions and identifying outliers contrast with annually reviewing SG&A as a total expenditure at business-unit level, compared to the previous year (Agrawal and Jochim, 2020, para. 27).

Another tool to enable optimised SG&A spending is to dynamically reallocate resources. Reallocating resources requires two steps from cost centre managers. The first step is to plan for the bare minimum needs of their division. The second step is a separate plan for value-added investments and strategic initiatives. The division in the planning for necessities and initiatives enables managers to identify the true discretionary costs (Agrawal and Jochim, 2020, para. 31).

When considering dynamic reallocation of resources, ZBB principles become relevant. Zero-Based principles assist decision-makers in ensuring that SG&A costs are invested where they should be, not where they have simply always been (Agrawal and Jochim, 2020, para. 1). In a 2020 survey by McKinsey & Company, 88% of the companies that participated (spanning various industries) with a negative profit outlook reported cost management as one of their top three priorities for the near future. Focusing on the companies with a positive profit outlook, 69% indicated cost management as one of the top three short-term priorities (Hawke *et al.*, 2020, para. 6).

By embracing a Zero-Based approach, organisations will be able to challenge service levels across all functions of SG&A. Instead of linking spending to the previous Budget, approval is based on essential requirements (Agrawal and Jochim, 2020, para. 17). The following section will consider ABC as a modern cost management tool for management’s control over Indirect costs, specifically SG&A costs.

2.8.2. Activity-Based Costing (ABC)

ABC and Activity-Based Management (ABM) are Management and Cost accounting tools *"of greater significance"* compared to more conventional tools in the competitive environment in which organisations operate (Patil and Kshatriya, 2016, p. 47). ABC is a costing technique often used in customer profitability analysis. ABC determines the cost objective's cost by first calculating the costs of activities using the cause-and-effect relationship between the cost objective consuming activities and activities consuming resources. ABC is generally classified as a more accurate method of determining the cost of a cost objective (Patil and Kshatriya, 2016, p. 48). ABC can assist an organisation in determining the non-value adding activities and, accordingly, resources consumed (Patil and Kshatriya, 2016, p. 48).

ABC emerged in the 1980s as an alternative to conventional cost allocation methods addressing the shortcomings and weaknesses of conventional methods (Glomazic, 2020, p. 89). One of the significant shortcomings of conventional methods of allocating costs is that it does not provide timely and accurate information to assist managers in their decision-making, especially in changing business circumstances with a drastic increase in Indirect costs (Glomazic, 2020, p. 89). Even though ABC was developed in product manufacturing organisations in western countries, it is a method that is also used in service organisations and the public sector (Glomazic, 2020, p. 89). ABC is acknowledged as a strategically focused, improved methodology in costing (Chenhall and Moers, 2015, p. 8). ABC's popularity lies in its evolution into ABM and strategic cost management (SCM) (Chenhall and Moers, 2015, p. 8).

ABM can only function in an organisation implementing ABC. As mentioned earlier, ABC works on a cause-and-effect basis. Therefore, it is possible to apply ABC to separate costs based on whether it relates to the product, customer, and organisation as a whole or unused capacity. Within each of these classifications, the related costs are apportioned based on their consumption of the relevant activity. ABC can aid an organisation to take the proper decisions based on the information it provides (Patil and Kshatriya, 2016, p. 53). Once the product or customer profitability has been established, managers apply ABM to look at the cost analyses and organisations can then take suitable action. Actions include root cause analysis, cost driver analysis, benchmarking, etc., for the organisation to find possible reasons for the profits and losses. This process can aid decision-makers in an organisation to understand what leads to increased profits and why these factors will increase profits (Patil and Kshatriya, 2016, p. 54).

ABC assumes that activities are the cost drivers in organisations. However, these activities require resources (Glomazic, 2020, p. 89). Since ABC enables costs to be allocated to a broader number and variety of activities within production, it moves the cost closer to the cost objective leading to a more accurate Indirect cost allocation to cost objectives (Glomazic, 2020, p. 90). ABC eventually leads to more accurate pricing of cost objectives (Glomazic, 2020, p. 90).

However, adoption rates for ABC and ABM remain low, even within the manufacturing industry. Reasons for these low adoption rates include lack of awareness, low motivation, high implementation costs, and the difficulty and time-consuming task of updating cost driver data (Patil and Kshatriya, 2016, p. 54; Glomazic, 2020, p. 91). The subsequent more sophisticated Management and Cost accounting tool organisations can implement is Lifecycle Costing. The following section explains the term Lifecycle Costing and explain SCM in more detail.

2.8.3. Lifecycle Costing and strategic cost management (SCM)

Lifecycle Costing entails considering the cost of a cost objective throughout its life, starting at its design, through research and development, introduction, enhancing, and, finally, phasing out of the specified cost objective (Patil and Kshatriya, 2016, p. 48). Lifecycle Costing assists an organisation in determining the price of a cost objective at the various stages of its lifecycle and planning the costs at these stages to manage these costs (Patil and Kshatriya, 2016, p. 48). One tool to manage these costs at different stages of the product lifecycle is SCM. SCM is applied when the costs incurred by an organisation are managed in line with the strategic direction of the related organisation, akin to the cost-benefit ratio. SCM uses two ways of competing, i.e. a) Cost leadership; and b) Differentiation (Patil and Kshatriya, 2016, p. 48). Cost leadership entails managing costs to such an extent that these costs are kept at a minimum without compromising the value provided to the customer. Differentiation is when an organisation has a cost objective with features, customer service, etc., different from its competitors, setting its cost objective apart, aiding the organisation in capturing the market and beating its competitors (Patil and Kshatriya, 2016, p. 48).

2.8.4. Target costing

Target costing is often used in the development of a new cost objective. Target costing starts with a market survey performed to determine the price the target market is prepared to pay for specified features of the cost objective. Along with the market survey, a study of the competitor’s corresponding cost objective features and prices is also performed. The survey mentioned above and study information are used to define the features of the new cost objective and determine the selling price. This target selling price, less the desired profit, indicates the maximum cost an organisation can incur in the provision of the cost objective (Patil and Kshatriya, 2016, p. 48).

In addition to changes in the conventional Management and Cost accounting tools organisations applied due to the ever-evolving modern business environment mentioned in this section, Budgeting is an area that requires some additional investigation. Section 2.5.5. of this chapter highlighted the criticisms against conventional Budgeting techniques. The following section will consider modern Budgeting techniques to answer the criticisms against conventional Budgeting.

2.9. Modern Budgeting

Section 2.5.5. discussed the conventional approach organisations apply when preparing their Budget and how academics doubt the effectiveness of conventional Budgeting methods. The quality of a Budget is not solely dependent on the selected Budgeting method but, also on the behaviour of the various estimators of the costs included in the Budget (Raghunandan *et al.*, 2012, p. 111).

An organisation can prepare an operational or strategic Budget. A strategic Budget stretches over a period exceeding a year, whereas an operational Budget is usually prepared for a year or less. Organisations prepare Budgets for their business as a whole based on the Budget for various individual parts of that organisation. These parts are referred to as responsibility centres (Glomazic, 2020, p. 91). Organisations decentralise the control of the business by establishing responsibility centres and applying responsibility accounting (Drury, 2018, p. 409).

2.9.1. Responsibility accounting

Responsibility accounting is a Management and Cost accounting system that utilises responsibility centres such as Cost (or Expense) centres, Revenue centres, Profit centres and Investment centres (Drury, 2018, p. 410). The main aim of using responsibility centres is management decentralisation to meet the information requirements of the internal management team (Khromova, 2020, p. 250). A decentralised or divisionalised management structure of an organisation indicates how decision rights in an organisation are differentiated and delegated (Chenhall and Moers, 2015, p. 8).

Using responsibility centres allow organisations to *"quickly control"* the costs and results at different responsibility levels in the organisation. Responsibility centres also enable organisations to evaluate managers' work by analysing deviations from planned outcomes. A Management and Cost accounting system utilising responsibility accounting also serves as a signal system (Khromova, 2020, p. 250). The responsibility centre manager is responsible for the unit's performance to achieve the organisation's objectives (Drury, 2018, p. 410; Glomazic, 2020, p. 91).

A Cost or Expense centre manager is usually responsible only for the costs incurred by their units. Discretionary Expense centres are units within an organisation without a clearly identifiable input-output relationship. The output of a discretionary Expense centre cannot be measured in financial terms. Revenue centre managers are responsible for financial outputs that generate sales Revenue. Profit centres are usually bigger independent units within an organisation. Profit centre managers are given more autonomy than cost or Revenue centre managers, since these managers are responsible for production and sales. Investment centres add to the responsibility of Profit centre managers, since these managers are also accountable for the capital investment decisions of their units (Drury, 2018, pp. 410–411).

Control within a responsibility centre occurs when variances from the Budget are determined at the organisational and responsibility centre levels. The responsibility accounting principle, therefore, forms the basis of Budgeting. The Budgeting process begins with the output (or activities) that the organisation plans to produce over the specific Budgeting period (Glomazic, 2020, p. 92). Again, Cost/Expense centres are typically SG&A departments with no causal relationship between inputs and outputs measurable in financial terms, hence complicating the application of responsibility accounting principles in these Overhead functions.

From the perspective of the low causal relationship between inputs and outputs in modern businesses with high Overhead costs, the control exercised by cost centres becomes complicated. On the contrary, investment centres are more effective, since the investment decision that affects the incurrence of Overheads is controlled. Investment centres incorporate the principles of Economic Value Added (EVA). EVA is a tool that organisations can apply to measure the performance of the company as a whole or for different divisions within a divisionalised structure (Drury, 2018, p. 502).

EVA operates from the principle that the main aim of managers of companies should be to maximise shareholder value (Drury, 2018, p. 502). When organisational performance is measured, it should keep pace with shareholder value. Shareholder value is in a closer relation with EVA than traditional profit measures (such as costs or Revenues in isolation) (Drury, 2018, p. 503).

EVA adjusts conventional residual Income (profit) for distortions arising from the application of Generally Accepted Accounting Principles (GAAP) in measuring profits (Drury, 2018, p. 503). The cost of capital charge is a measure influenced by the divisional manager of an investment centre. An investment centre is the only responsibility centre where the manager can control the investment decision, since EVA measures whether a division's return exceeds the capital invested, indicating the creation of shareholder value (Drury, 2018, p. 503).

Responsibility accounting is a step organisations can take to move in the direction of thinking "*Beyond Budgeting*", planning continuously (Amato, 2020a, para. 32; Bogsnes, 2020, para. 16). Continuous planning entails a rolling forecast, blending changes and improvements into your plan as fast as possible (Amato, 2020a, para. 33). McKinsey & Company suggests two forms of Budgeting to enable this optimisation: a Driver-Based Budgeting plan or a ZBB plan (Agrawal and Jochim, 2020, para. 28). Together with Activity-Based Budgeting (ABB), these two concepts are discussed in more detail in the following subsections.

2.9.2. Driver-based Budgeting

Driver-Based Budgeting is a process of planning and Budgeting focusing on the variables in an organisation with the biggest impact on the performance of the organisation (Staff Writer, 2021c, para. 1). A driver-based Budgeting plan is helpful for indirect spending, but where a productivity rate can be determined. Where a driver-based plan is incorporated, the volume of output, productivity rate, and cost per output unit are required. The Budget is automatically calculated and adjusted as the volume changes (Agrawal and Jochim, 2020, para. 29). Driver-based Budgeting is applicable to indirect spending, since it shifts the focus of an organisation's Budget away from typical volume-based drivers to the true drivers of the performance of the organisation and adjusts the Budget accordingly (Staff Writer, 2021c, para. 3).

2.9.3. Zero-Based Budgeting (ZBB)

ZBB is a method that arose as part of the theory and practice of cutback management (Schneider and O'Bryan, 2018, p. 2). Literature suggests that ZBB was first used by the US Department of Agriculture in the early 1960s. The concept of ZBB was further promoted in the 1970s when Pyhrr described the system he implemented as the manager of New York Stock Exchange (NYSE) listed company, Texas Instruments. He suggested that all funds be allocated on a cost/benefit basis (or any similar method of evaluation) (Draper and Pitsvada, 1981, p. 76; Martin, 2021, p. 42). Jimmy Carter adopted Pyhrr's concept of Budgeting in his position as governor of Georgia, and ZBB became a popular research topic (Schneider and O'Bryan, 2018, p. 2; Coyte, Messner and Zhou, 2021, p. 8). The popularity of ZBB decreased in the 1980s, most probably due to the complexity of implementation (Hopkins *et al.*, 2015, p. 2). Over the last few years, ZBB as a method has again gained popularity and attention (Coyte *et al.*, 2021, p. 7).

ZBB promotes a practice of Budgeting where there is no historical foundation, with all programmes reviewed from a zero base (Wildavsky and Hammond, 1965, p. 324; Coyte *et al.*, 2021, p. 8). ZBB requires that an organisation start with a clean slate (zero) when determining its Budget for the upcoming year. ZBB forces the related manager to define the actual needs of the business unit based on efficiency and necessity instead of historical Budgeted figures (Hopkins *et al.*, 2015, p. 1; Agrawal and Jochim, 2020, para. 30; Martin, 2021, p. 42). ZBB differs from conventional (incremental) Budgeting processes, since no item is automatically included in a Budget (Hopkins *et al.*, 2015, p. 2).

During the ZBB process, Budget preparers review every programme and Expense at the start of the Budget cycle and then have to justify the related line item to receive funding (Hopkins *et al.*, 2015, p. 2; Schneider and O'Bryan, 2018, p. 1; Staff writer, 2018b, p. 10). ZBB can be applied in the Budgeting process of any cost, i.e. cost of sales, capital expenditure, SG&A costs, operating costs, marketing costs, etc. (Hopkins *et al.*, 2015, p. 2).

The effective application of ZBB can lead to radical savings for an organisation (Hopkins *et al.*, 2015, p. 1). ZBB can also liberate an organisation from cemented methodologies and departments. It requires that an organisation completely reconsider each Expense item and the structure of where the Expense is incurred (Hopkins *et al.*, 2015, p. 1). Unfortunately, unsuccessful ZBB implementation could also cost organisations considerably (Hopkins *et al.*, 2015, p. 1). ZBB has regained popularity in the public sector, mainly due to the 2008 recession affecting the global economy, resulting in contemporary fiscal constraints (Hopkins *et al.*, 2015, p. 2). Therefore, using ZBB has both benefits and challenges in implementation.

2.9.3.1. Benefits of ZBB

The benefits of ZBB prove that it is a valuable Budgeting method. Firstly, ZBB could improve the efficiency of organisations as a result of workers being encouraged to work together to analyse operations (Hopkins *et al.*, 2015, p. 3). Cost centres are forced to identify their priorities and objectives in the analysis of operations, clarifying the purpose of the Budget (Staff writer, 2018a, para. 1; Martin, 2021, p. 43). ZBB is a means to the stricter management of resources, aiding in increasing the effectiveness of an organisation's resource allocation (Coyte *et al.*, 2021, p. 12). The actions of Cost centres could, as a result, align an organisation's strategic goals with its resource allocation. This increase in effectiveness will also assist organisations in making better decisions in managing their Budget (Martin, 2021, p. 43). ZBB could further increase internal and external transparency (Hopkins *et al.*, 2015, p. 3; Martin, 2021, p. 43).

ZBB promises cost reductions and could also boost the growth of an organisation (Falcon *et al.*, 2018, para. 1). ZBB further allows an organisation to respond to a Budget reduction step-by-step (Schneider and O'Bryan, 2018, p. 1). One of the primary consequences of ZBB is that discretionary costs are scrutinised, resulting in cost savings (Coyte *et al.*, 2021, p. 13). The apparent reason for the cost savings is that ZBB requires of managers to justify all costs and not simply roll all costs forward. A Budget prepared from scratch with sufficient justification for all cost items is particularly useful for expenditure with no direct input-output relationship, in particular expenditure forming part of SG&A (Coyte *et al.*, 2021, p. 11). SG&A spending could be reduced by 10% to 25% by the proper implementation of ZBB (Callaghan and Mignerey, 2014, para. 6; Staff writer, 2018b, p. 10).

2.9.3.2. Challenges of ZBB

Even though ZBB is highly beneficial, as described in the previous section, it is a costly, time-consuming, and complicated process, even more so when compared to conventional Budgeting practices (Hopkins *et al.*, 2015, p. 3; Martin, 2021, p. 42). The prioritisation of the needs of programmes is often threatening to managers. It can also prove challenging for business units with intangible outputs (Hopkins *et al.*, 2015, p. 3). In government agencies, implementing ZBB might be a difficult task, since most costs incurred by these institutions are personnel costs. Personnel costs tend to be challenging to decrease due to political pressures, limiting the available levers for cost reductions (Hopkins *et al.*, 2015, p. 3).

ZBB could also place an organisation's brand at risk, since its implementation could prove to be a risk to a company's ability to deliver its output at a premium and therefore influence the customer experience. For organisations relying on high levels of service delivery to maintain their brand and premium pricing, an unintentional culture shift could result from a more cost-restrictive approach. In other words, if organisations decide to cut costs perceived as non-essential to the company's operations but that might have been core to the customer experience, the organisation's brand might be harmed, and the cost-cutting strategies, therefore, backfire (Hopkins *et al.*, 2015, p.

3). A further risk is that ZBB might become a distraction, causing organisations to fail to deliver on all possible cost-saving opportunities (Martin, 2021, p. 43).

2.9.3.3. Implementing ZBB

An organisation does not have to implement ZBB throughout the organisation. ZBB can be applied in specifically selected business units, or irregularly (Kavanagh, 2011, p. 18; Hopkins *et al.*, 2015, p. 3). A study performed during the height of ZBB popularity in 1981 contains the data of similar but separate computing centres at three different universities during their planning process. Two centres were control groups, applying incremental Budgeting, with one centre, being the test group, applying ZBB (Wetherbe and Montanari, 2018, p. 6). The conclusion reached in the related study is that in a service-oriented environment, a service unit applying ZBB in an integrated planning framework is characterised by an increase in the quality of user service, compared to service units applying incremental Budgeting (Wetherbe and Montanari, 2018, p. 11). Therefore, a manager can be confident that a ZBB process implemented during planning could increase user satisfaction. Each Expense item must be justified and cause the superior performance of an organisation's service function (Wetherbe and Montanari, 2018, p. 11; Coyte *et al.*, 2021, p. 9).

ZBB and Driver-Based Budgeting are not the only modern Budgeting methods available. As mentioned in section 2.5.5., ABB is also available to address the criticisms against conventional Budgeting methods.

2.9.4. Activity-Based Budgeting (ABB)

ABB is a Budgeting method designed to reduce or abolish the disadvantages of more conventional Budgeting techniques (refer to section 2.5.3.1.) (Pietrzak, 2013, p. 27). ABB is a Budgeting concept derived from ABC (refer to section 2.8.2.) as an extension of ABC into the realm of Budgeting. ABB requires of organisations to determine the cost of planned activities, taking the size and resources required into account (Pietrzak, 2013, p. 27).

The main advantage of implementing ABB is that organisations can associate costs with activities more effectively. This association between costs and activities means organisations can plan more precisely and make more effective corrections (Pietrzak, 2013, p. 27). Benefits reported by organisations in a study by Pietrzak (2013, p. 27) include the establishment of more realistic Budgets, linking costs to outputs more effectively, improved allocation of costs to the responsibilities of staff and enhanced accuracy and identification of resource requirements (Pietrzak, 2013, p. 27).

The only disadvantage of ABB is that it requires the implementation of ABC. The implementation of ABC requires financial resources and is time-consuming. ABC implementation also entails an in-depth knowledge of the organisation and Activity-Based concepts, often hiring a specialist (Pietrzak, 2013, p. 27). Unfortunately, the related requirements of ABB implementation may prove insurmountable, in particular for smaller organisations (Pietrzak, 2013, p. 27).

2.10. Summary

The main aim of this chapter was to explain the Management and Cost accounting principles and concepts applicable to this study. The changing business environment and the rapid changes in technology necessitate rational managerial decision-making to ensure the survival of organisations.

Management requires relevant information for rational decision-making. Cost accounting data are the primary source of information to ensure goal-oriented planning, control and performance measurement. Management and Cost accounting is a field that developed due to the inability of financial accounting information to provide the relevant information to managements. What is, however, apparent is that the modern business environment has changed significantly from the time when Management and Cost accounting was first developed.

The two most notable changes experienced by the business environment are an increase in the number of service organisations compared to manufacturing organisations globally, and a change in the cost structure of organisations due to automation resulting from technological developments. This change in cost structure is characterised by an increase in the proportion of Indirect costs to total costs, with a significant decrease in variable costs.

The history of Management and Cost accounting investigated in this chapter revealed that it is a field that was developed for manufacturing organisations (with a clear causal relationship between inputs and outputs). Management and Cost accounting is also a field that has not experienced the same developments as the business environment. The application of the related tools remains limited in the modern business environment, especially in service organisations with intangible cost objectives.

In service organisations, the intangibility of the cost objective means that it is difficult to identify an input-output relationship. This lack of a causal input-output relationship increases when high Overhead costs are present, since these costs are Indirect, with no causal relationship to the organisation's output.

Service organisations and organisations in the modern business environment, with the majority of costs Indirect and fixed, consisting primarily of Salaries, place a further limit on the Management and Cost accounting tools that could currently be applied in these organisations, since Salaries act as a sticky cost. Sticky costs entail that even though Salary costs are discretionary costs that an organisation can reduce over a more extended period, if needed, a reduction in the number of personnel will not necessarily lead to a proportional reduction in costs. This results from other costs involved when considering Salaries like retrenchment Expenses, for example.

Using Management and Cost accounting tools under normal economic conditions in service organisations is complicated. When considering the current global disruption affecting businesses, Management and Cost accounting tools are more useful than ever, but services cannot utilise these tools effectively.

Literature lacks sufficient solutions to address the shortcomings of Management and Cost accounting tools in services. This chapter discussed a few modern tools that could be considered, including managing SG&A costs, ABC, Lifecycle Costing, Target Costing and Modern Budgeting. Modern Budgeting tools discussed in this chapter focus on responsibility accounting, Driver-Based Budgeting, ZBB and ABB. One area that urgently requires thorough research is the management of Overheads. This chapter commented on the lack of recent research addressing the management of Overheads and investigated older sources, remaining relevant in the current business environment, that contributed to the body of knowledge surrounding the management of Overheads, specifically discretionary Overheads.

Even though automation/mechanisation and the changes to the external business environment serve as justification for the rise in Overheads, this phenomenon could also be a result of insufficient management of especially discretionary Overheads. The literature reviewed in this chapter confirmed that the Management and Cost accounting practices did not keep track with the changes in the cost structures of organisations and even possibly contributed to the escalation in Overhead costs.

When considering the application of Management and Cost accounting tools, the primary purpose of these tools is to aid organisations' decision-making processes. These decisions are more critical than ever before due to the disruption organisations are facing globally. The next chapter (Chapter 3) focuses in more depth on the disruption businesses are facing all over the globe. Chapter 3 will also look at South African-specific conditions disrupting the business environment and then move towards the disruptions faced by universities. It is important to understand how the disruptive environment impacts businesses in order to consider how to address the concept of efficiency as the focus of this study.

Chapter 3 – Disruption faced by the global business environment and universities

3.1. Introduction

"*A crisis presents unique challenges in making wise spending decisions*."

(Agrawal and Jochim, 2020, para. 1)

Chapter 2 discussed the changes the global business environment faced over the past years. Most of the time, these changes were gradual, following developments in technology and consumer behaviour, as is expected in the normal course of business. Unfortunately, even gradual changes meant that Management and Cost accounting had become outdated in the most significant part of the business environment. Apart from these changes in the normal course of business, some events occur unexpectedly, completely changing how the business environment functions and necessitates a complete overhaul of how things were usually done. These events are called disruptive events.

From the literature studied in the previous chapter, when organisations must change their business models, relevant, accurate and timely data are required to assist with the decision-making process. The data are typically obtained from an organisation's Management and Cost accounting system. Changes in the organisational environment due to developments in the normal course of business cause the value of Management and Cost accounting to be questioned. Disruptive events, therefore, increase the question surrounding the value of Management and Cost accounting.

Disruptions typically affect different industries. It is critical to comprehend the significant disruptions faced by various industries to truly understand the importance of effectively applying Management and Cost accounting at universities as the main industry studied.

Almost never before has industries and their related organisations globally experienced so many disruptions, impacting their very survival, as currently. Understanding the threat of disruption requires an understanding of the concept of disruption. Disruption describes "*radical change*" in a current pattern or model (Shaw and Chisholm, 2020, p. 1). According to Shaw and Chrisholm (2020, p. 2), Harvard Business School professor Clayton Christensen defines disruption as *"an innovation that makes things simpler and more affordable, and 'technology' is a way of combining inputs of materials, information, labour, and energy into outputs of greater value"*. To simplify the before-mentioned definition of disruption, Shaw and Chrisholm (2020, p. 2) state that disruption is when stakeholders of a system cannot adapt to the changes upsetting the system (Shaw and Chisholm, 2020, p. 2). Said changes include scientific research, changes in technology, various organisational developments, and different forms of innovation. Once these innovations overthrow the normal way of doing things, they are considered disruptive (Shaw and Chisholm, 2020, p. 2).

Based on the definition of disruption, this chapter will look at five disruptive events that had a significant impact on the global business environment also affecting universities globally and specifically in South Africa. These disruptions include 1) technological disruption, 2) the 4IR, 3) intellectual commercialisation, 4) the COVID-19 pandemic, and 5) #FeesMustFall. This chapter aims to provide a brief overview of the disruptions mentioned, focusing on the impact of the disruption on the affected organisations within the disrupted industry with a brief overview of the impact on universities as the main industry focused on in this study. The chapter concludes with a discussion on management's reaction to disruption.

3.2. Technological disruption

The COVID-19 pandemic forced many organisations to re-engineer their business processes to become automated, implement newer digital communication platforms and run their organisations remotely without frequent travelling (Arend, 2020, p. 85). The success with which some organisations scaled the COVID-19 disruption by using technology proves that technology should no longer be seen as a cost but should be treated as a value-adding tool aiding an organisation to effectively respond to disruption (Arend, 2020, p. 85). However, the pace of change associated with technology often leads to technology disrupting whole industries.

In the modern business environment, innovation is accelerating (Spinelli and Adams, 2016, p. 12). Moore’s law is an illustration of the pace of technological innovation.

According to Moore's law, the rate at which a microchip's computing power doubles is every 18 months (Spinelli and Adams, 2016, p. 115). Technological innovation means that new industries are replacing older ones. The extent of this replacement is evident when looking at Fortune 500 companies. In the 1960s, 35% of Fortune 500 companies were replaced over a period of 20 years, accelerating to every five years in the 1980s, with a further increase of pace in the 1990s where 35% of the Fortune 500 companies were replaced every three to four years (Spinelli and Adams, 2016, p. 10).

Digitalisation is one form of technological disruption. Digitalisation is when digital data and technologies are used to get the required job done (De Jong and Van Dijk, 2015, para. 7). Advances in technology, together with advances in logistics and manufacturing, created the opportunity for almost 80% of all small- to medium-sized enterprises to compete on a global scale (Spinelli and Adams, 2016, p. 4). When considering the impact of digitalisation because of advances in technology on organisations, there is a universal belief that sales can only be increased if production increases. One customer can only use one unit of goods sold at a time. An increase in production accordingly required increases in resources, equipment, and labour. Although organisations benefited from Economies of Scale (see section 2.6.1.), they could never get their marginal cost to zero (De Jong and Van Dijk, 2015, para. 9). Digitalisation has changed this universal belief and can replace entire industries (De Jong and Van Dijk, 2015, para. 10). Additionally, digitalisation can drive marginal costs to zero since more than one customer can simultaneously utilise digital goods (De Jong and Van Dijk, 2015, para. 10).

One example of a total industry being replaced as a result of digitalisation is the film and photography industry. In 1975, Kodak engineer Steve Sasson invented the first digital camera. Sony, however, introduced the first electronic camera in 1981. Kodak failed to prepare itself for the disruption in a ten-year window of opportunity (Mui, 2012, para. 1; Shaw and Chisholm, 2020, p. 1). This failure resulted from the inability of the management team of Kodak to see the disruption in digital photography by the improved efficiency and ease of access of electronic cameras causing the digital camera industry to be almost completely extinct (Arend, 2020, p. 85). Then came mobile phones and disrupted this market again with *"devastating effects"* (Richter, 2019, para. 3).

Skype is a further example of a new industry disrupting an existing industry. Skype was established in the early 2000s and allowed users to make Skype to Skype calls free of charge using their computers or to other landlines and mobile phones at a fee. Consumers globally embraced this development with Microsoft acquiring Skype in May 2011 at a price exceeding $8 billion (Spinelli and Adams, 2016, pp. 10–11). The development of Skype is an example of disruption of the traditional landline telephone industry.

A third example of technological disruption is blockchain. Blockchain is a virtual ledger that can record and verify digital transactions at high volumes. Blockchain technology started as a basis for managing cryptocurrencies (like Bitcoin) but is expanding to many other sectors (Staff writer, 2022a, para. 1). For example, banks are one of the leading industries disrupted by blockchain technology (De Jong and Van Dijk, 2015, para. 1; Staff writer, 2022a, para. 1). The aforementioned disruption is due to intermediaries being cut out of the key services provided by banks. One example is payments. Blockchain technology could ensure faster payments at lower costs, completely cutting out banks as intermediaries (Staff writer, 2021a, para. 8). CB INSIGHTS predicted that, apart from the banking sector, 64 other industries could be disrupted by blockchain technology, including travel, infrastructure, healthcare, government, retail, agriculture, information and communication, and entertainment (Staff writer, 2022a, para. 5).

Numerous examples exist of organisations that failed to embrace disruption in the form of emerging technologies and, therefore, paved the way for their competitors to embrace the opportunity to gain an advantage (Shaw and Chisholm, 2020, p. 2). Kodak, as mentioned, failed to gain from the digital camera invention, and Xerox failed to embrace the personal computer market, despite their involvement in the development of most core technologies (Shaw and Chisholm, 2020, p. 2). Another example of a business affected by the disruption of an industry is Nokia that failed to adapt to the developments in the mobile phone market (Shaw and Chisholm, 2020, p. 2).

These examples of businesses failing to benefit from technological disruption could result from prominent organisations, traditionally, failing to incorporate innovation in their organisational models. However, these organisations can also cause disruption in if they can identify and overcome what limits their beliefs on conducting business (De Jong and Van Dijk, 2015, para. 10). The disruptions caused by new and innovative technologies are characteristic of the 4IR, discussed in the next section.

3.3. The Fourth Industrial Revolution (4IR)

One of the most widely discussed global disruptions is the 4IR (Serfontein, 2019, p. 5). The 4IR is characterized by various new technologies fusing the digital, physical, and biological spheres. The 4IR will impact all industries, economies, and disciplines, even challenging the meaning of being human (Schwab, n.d., para. 3).

The differentiation of the 4IR from other revolutions is the blurred boundaries between the digital, physical, and biological spheres. These blurred boundaries mean that technologies (including autonomous vehicles), the IoT, and AI are merged into our everyday lives (Petcu *et al.*, 2020, p. 92). An important question to address in the onslaught of the 4IR is how susceptible existing jobs are to computerization (Frey and Osborne, 2017, p. 254). The past few decades saw computers as a substitute for various jobs, including but not limited to telephone operators, cashiers, and bookkeepers (Frey and Osborne, 2017, p. 254). Currently, routine based operations for which an algorithm can be developed, have experienced a notable increase in job losses (Frey and Osborne, 2017, pp. 254–255). However, according to Brynjolfsson and McAfee (2011, p. 13), it is not only routine, mundane tasks that are at risk of computerization, but also complex tasks requiring the processing of various stimuli that can be automated like driving a car.

When considering the impact of the automation of skills and need for new skills, organisations and their employees aren't keeping up with the rapid pace of digital technological change as a typical characteristic of the 4IR (Brynjolfsson and McAfee, 2011, p. 21). This fast pace of change leaves millions of people behind, destroying their Income and jobs, and negatively impacting their purchasing power (Brynjolfsson and McAfee, 2011, p. 21). Another disruption is intellectual commercialisation, especially disrupting the higher education industry.

3.4. Intellectual commercialisation

Schmidt (2020, para. 6) stated that the commercialisation and commodification of knowledge is *"fundamentally flawed"* and suggested that many universities' problems can only be fixed if leaders and politicians realise that knowledge should be free. However, globally critique is offered in terms of intellectual commercialisation and the related drastic increases in Tuition Fees noticed (Parker, 2020, p. 5; Schmidt, 2020, para. 5; Dickler, 2021, para. 15).

Ivancheva and Garvey (2022, pp. 8–9) comment on the increase in publicly funded universities becoming commercially-driven employers of labourers. This commercialisation included streamlining academic labour processes with the aid of technology. When considering the term 'Intellectual commercialisation' it is linked to public universities being more focused on producing profit for private sector actors than increasing value for the public good. From the statement by Ivancheva and Garvey, it is clear that public universities are at risk of focusing too much on increasing their Revenue, often requiring funding from private organisations; hence often forgetting their primary purpose of rendering affordable education to the public.

The result of intellectual commercialisation is that students have become consumers and can choose what, when and where to learn. Universities have similarly started treating students as consumers and according to Schmidt (2020, para. 7) treating students as consumers have increased the focus of universities on "*bums on seats*" and accordingly bankrupted the UK's university system financially and morally since a university sector that is dependent on students who can afford their fees cannot attract the best.

When the impact of a university education as a commodity is considered in the US, this quote from the Boyer Commission on Educating Undergraduates in the Research University (1998, pp. 5–6) already in 1998, summarises the crisis:

> *"To an overwhelming degree, they (American research universities) have furnished the cultural, intellectual, economic, and political leadership of the nation. Nevertheless, the research universities have too often failed their undergraduate populations and continue to fail. Again and again, universities*

are guilty of an advertising practice they would condemn in the commercial world. Recruitment materials proudly display the world-famous professors, the superb facilities, and the ground-breaking research within them. Still, thousands of students graduate without ever seeing the world-famous professors or tasting genuine research. Some of their instructors are likely to be badly trained or untrained teaching assistants groping their way toward a teaching technique; others may be tenured drones that deliver set lectures from yellowed notes, making no effort to engage the bored minds of the students in front of them."

The quote mentioned above reiterates the pressure universities face in managing students as consumers, using over-emphasised advertising, but failing to deliver on the promises in a drive to increase their enrolments. When considering the global trend of decreasing government subsidies and increasing tuition, it is clear that in 2022, the findings from the Boyer Commission will remain just as relevant as in 1998 for universities all over the world with an outcry for affordable education.

When considering affordable education, the 19th-century German social democrats argued that people should be judged only on merit, not social class or wealth. As a result of intellectual commercialisation, the current university sector cannot attract the best since it is dependent on who can afford the fees (Schmidt, 2020, para. 6). When graduates become a product of funds and not ability, employability of graduates is questioned and the employability of graduates is one of the most important issues universities must consider (Holmes, 2013, p. 539; González-Romá, Gamboa and Peiró, 2018, p. 132). Employability can be defined as: "*a set of achievements – skills, understandings and personal attributes – that makes graduates more likely to gain employment and be successful in the chosen occupations, which benefit themselves, the workforce, the community and the economy*" (Yorke, 2004, p. 410, 2005, p. 8; Warraich, 2008, p. 4). Employability is the basic skills graduates require to get, keep, and do a job well. These skills enable graduates to obtain knowledge and professional and personal skills to encourage these graduates to acquire the correct attitudes that will strengthen their development and employment in the future (Robinson, 2000, p. 1; Warraich, 2008, p. 3).

The same argument can be made for South Africa. South African universities also need to provide affordable education to students that will ensure employability (Smit and Serfontein, 2019, p. 1346). Unfortunately, this does not seem to be the reality as South African students experienced Tuition Fee increases exceeding inflation over the last 15+ years (Editorial, 2016d, para. 4; Koornhof, 2020, paras 14–15). Although the situation in South Africa is by no means ideal to provide free education, as a country plagued by high unemployment and resulting poverty, students' access to universities relies on their ability to pay tuition much more than their intellectual capacity. It appears that the ongoing issue of intellectual commercialisation could lead to traditional universities globally becoming so driven in increasing enrolments that they neglect to ensure the employability of all their graduates by encouraging enrolments in programmes that are necessary in the modern organisational environment.

Employability (discussed in more detail in section 3.6), in economic terms, has become an educational outcome since employability is connected to an expectation of lifetime earnings (Holmes, 2013, p. 539; Martini and Fabbris, 2017, pp. 352–353). This expectation of lifetime earnings and the decreasing trend of government spending on higher education means that students (and often their families) must bear the increasing cost of obtaining a higher education (Holmes, 2013, p. 539). It is therefore critical that universities teach the correct skills to their students to ensure that the expectation of lifetime earnings becomes a reality by improving the chances of graduates to become employed .

The impact of intellectual commercialisation and the resulting decrease in the employability of students plaguing South African universities are seen in the unemployment rate among young graduates of 32.6% in quarter 1 of 2022 (ages 15-24 years). The graduate unemployment rate for ages 25-34 years was 22.4% for quarter 1 in 2022 (Editorial, 2022c, para. 1). This implies that about one out of every four South African graduates was not employed in the first quarter of 2022. Continuing on a path of intellectual commercialisation could have negative results and therefore it is unavoidable that universities must change their current organisational model (Saayman, 2020, p. 4). The next section focuses more specifically on the impact disruptions had on the higher education industry, starting with the most recent disruption, the COVID-19 pandemic.

3.5. COVID-19 and #FeesMustFall

Historically, universities globally have been on the receiving end of various disruptions, of which COVID-19 is the latest. Since 2015, internationally, universities experienced various protests halting activities on campuses (Ratcliffe, 2015, p. 1). More specifically, South African universities have experienced many disruptions, of which COVID-19 and #FeesMustFall can be considered the most severe since 2015. This section discusses the global and local impact of COVID-19 as a disrupting event affecting the global business environment. This section further includes an overview of the impact of COVID-19 and #FeesMustFall protests that shook the South African university landscape.

3.5.1. Global impact of COVID-19

COVID-19 is the most recent global disruption event affecting people and organisations globally (Bogsnes, 2020, para. 7; Lapier, 2020, p. 18). The disruption caused by COVID-19 is unique, since it is not in the same category as a recession, natural disaster or a terrorist attack (Lapier, 2020, p. 18). What COVID-19, however, has in common with the disruptions mentioned is that addressing the disruption required careful planning and the resulting execution of the developed plan whilst placing a greater reliance on IT and digital resources (Lapier, 2020, p. 18). Globally, stakeholders of various systems struggled to adapt to the changes brought about by the COVID-19 pandemic and the resulting lockdowns. The economist Robert Shiller sheds light on the disruption of COVID-19, stating that not only one but two pandemics exist. Firstly, the COVID-19 health pandemic, setting the second pandemic, anxiety due to the economic consequences of the COVID-19 pandemic (Shiller, 2020, paras 1–2). The second pandemic led to financial anxiety because of the closure of businesses, increased unemployment levels, and volatile and crashing markets (Peters *et al.*, 2020, p. 1). According to the same authors, travel, tourism, retail, hospitality, and international education are industries that will experience long-term effects due to the disruption caused by the COVID-19 pandemic.

The impact of COVID-19 on education was observed in the most robust sense through the move of traditional universities to fully online universities. To understand the full impact of moving some or all teaching to an online platform, the difference between online, distance and blended education (learning) is vital. The American Bar Association defines distance education as any course where the lecturer and students are separated from each other for a period equivalent to at least one-third of the usual instruction. Instruction must also include using technology to facilitate interaction amongst students and between students and faculty (Oranburg, 2020, p. 3). Distance education can also refer to the distance between students and instructors in cyberspace (Peters *et al.*, 2020, p. 15). Distance education is the blanket term for all learning outside of a traditional classroom and includes online learning and technology-mediated instruction (Stern, n.d., para. 3; Oranburg, 2020, p. 3).

Chinese universities were the first universities to go entirely online due to the COVID-19 pandemic. This move affected around 30 million students from 3 000 organisations (Lau *et al.*,2020, para. 9). Most United Kingdom (UK) universities also moved their classes online and suspended face-to-face teaching because of COVID-19. Cambridge University is a good example where lockdown came fast. Staff had two days to sort out remote working before the doors were locked. However, Cambridge had one advantage over other universities since they had been building their Information Technology (IT) team as a result of exploring learning digitally (Peters *et al.*, 2020, p. 10). Universities in the US followed the example of their UK counterparts and moved their teaching and learning online. The US universities that moved to online classes during the COVID-19 lockdowns include the Massachusetts Institute of Technology (MIT), Caltech, Princeton, Chicago, Stanford, Duke, Johns Hopkins, Cornell, Columbia, Yale, and Pennsylvania (Elers, 2020, paras 3–4).

The examples provided clearly show that COVID-19 forced universities globally to reconsider higher education practices (Peters *et al.*, 2020, p. 8). Managers in the higher education sector viewed the challenges caused by the COVID-19 pandemic as the most difficult challenge after the difficulties caused by the second world war (O'Hara, 2020, para. 1).

On the one hand, COVID-19 challenges included getting as many students as possible to learn interactively and return to campuses. On the other hand, safety fears pulled universities in the other direction. Getting students back on campus was especially important for universities with a weaker financial stance (O'Hara, 2020, para. 2). One of the factors that placed an increased financial burden on universities was the decrease in the number of international students due to travel restrictions, with students and parents who demanded fee rebates on tuition as well as residence fees with the outbreak of the COVID-19 pandemic and resulting lockdowns (Koornhof, 2020, paras 21–22). The effect of travel restrictions was seen at some Australasian universities, depending primarily on international students, that closed for the remainder of the semesters affected by COVID-19 (Hess, 2020, para. 1; Peters *et al.*, 2020, p. 2). This closedown could cause losses of up to $40 billion for the Australian economy by the end of 2023 (Editorial, 2020a, para. 4). The financial pressure on universities is increased by the possibility that Third-stream Income (refer to section 4.2.) will also decrease since the organisations responsible for these funds will cut back due to the financial risks they face resulting from COVID-19 (Koornhof, 2020, para. 26; Naidu and Dell, 2020, para. 34).

In the UK, the after-effects of COVID-19 and the associated forced move to online education has the potential to lead to up to 13 universities facing financial disaster. This financial disaster will affect one in 20 students. It was further estimated that the UK higher education sector will incur losses of between £3bn and £19bn (the size of the loss is dependent on the number of students deciding not to enrol) as an after-effect of COVID-19 (Adams, 2020, paras 1–2).

Besides the possible losses mentioned, other financial pressures arising from COVID-19 include the investment in additional resources to implement distance education effectively since intentional online teaching changes content as well as the method of delivery. COVID-19 has changed the university landscape from primarily face-to-face and on-campus teaching to being entirely online at an increasing rate, a change that is here to stay (Peters *et al.*, 2020, p. 20,22). These changes raise the question of how teaching staff, more specifically, teaching staff without any technology-aided teaching training, ensure the continuity of teaching (Forster, 2020, p. 21; Oranburg, 2020, p. 3). What is unavoidable is that universities, just like other organisations, need to invest in training educators to shift to remote working and teaching (Forster, 2020, p. 20; Mtshali, 2020, paras 16–17). Implementing technology-aided teaching correctly will require technical support and time. The necessary support and time will lead to additional development-related costs (for example, utilising high-quality video) (Peters *et al.*, 2020, p. 15; Saayman, 2020, p. 2). The mentioned financial pressure is emphasised even more at South African universities who faced severe financial pressures even before the outbreak of COVID-19 (Smit and Serfontein, 2019, p. 1333).

3.5.2. COVID-19 and South African universities

The changes brought about by COVID-19 that struck South Africa at the start of 2020 forced educators to adjust their course. This change in course included pedagogical models suiting the present conditions of constant change, uncertainty and risk since the COVID-19 pandemic has forced all teaching organisations to embrace technology to ensure continuity of education (Oranburg, 2020, p. 3; Peters *et al.*, 2020, p. 2). Technology was forced upon most universities (Saayman, 2020, p. 2; Smit and Serfontein, 2020, para. 2). This forced move to various forms of distance education required many changes for educators, from the online basis for interacting with students, preparing online materials, prompt feedback on assignments and innovative forms of student assessments to timely notifications on schedules and programmes utilising social media platforms (Peters *et al.*, 2020, p. 8). However, the educational system in South Africa was not adequately prepared. The closure of schools due to the lockdown resulting from the COVID-19 pandemic in March 2020 interrupted the learning of close to 17 million learners from pre-school to secondary school. About 2.3 million enrolled students in institutions for post school education were also affected by lockdowns (Editorial, 2022b, para. 1).

The impact of lockdown on South African students is entwined with a socio-economic context characterised by poverty and inequalities (Wangenge-Ouma and Kupe, 2020, p. 1). The impact of the poverty and inequalities on South African students meant that a move to online education, as was required by COVID-19, was no easy task. Socio-economic conditions for most South Africans mean no access to electronic devices to facilitate online learning, and those who have devices have limited or no access to bandwidth. Many students also live in physical conditions not conducive to studying like one bedroomed houses with only a shared table for studying, or where there is no quiet space that is ideal to focus (Shay, 2020, p. 9).

The conditions of South African students mentioned in the previous paragraph necessitated a return to campus (Naidu, 2020, paras. 10–15). This necessity was fulfilled in March 2021, that saw universities country-wide opening for a blended approach to learning, including some modules taught entirely online and some with a face-to-face component added allowing a number of students to return to campus (Charles, 2021, para. 1; Naidu, 2021, para. 10). Blended education includes ensuring students can access high-quality content, even if this access remains remotely (Naidu, 2020, para. 10). Like international universities, blended learning in South Africa means students can benefit from the innovation and flexibility provided by online teaching and enjoy face-to-face instruction (Naidu, 2020, paras 12–14).

However, blended learning is not without challenges. For one, blended learning impacts the students' prerogative to remain at home. Students opting to stay at home will affect the occupancy rate of residences and, eventually, the financial bottom line of the related universities (Naidu, 2020, paras 18–21). A further complication related to blended learning could be a decrease in the number of students registering at universities, which could mean that these institutions will not be able to reach their agreed-upon targeted enrolments (Naidu, 2020, paras 18–21). This entails that South African universities' funding crisis increased due to COVID-19, pressuring all university Income streams (Naidu, 2020, paras 27–28). One measure universities can implement to counter the pressure on their Income streams is to manage their costs very carefully. Additional measures that can be implemented to manage spending at universities include deferring or even cancelling planned projects (including the expansion of infrastructure), managing maintenance costs, staff appointments, growth strategy and staff salary increases (Koornhof, 2020, para. 28; Naidu and Dell, 2020, para. 15). These measures are critical, since universities would face the effects of this pandemic for a projected three to five years (Koornhof, 2020, para. 32).

Unfortunately, COVID-19 was not the first shutdown universities in South Africa have experienced. University shutdowns are not a new phenomenon in the South African higher education landscape. The disruption caused by the 2015 #FeesMustFall campaign is one of the most severe university shutdowns faced by South African universities.

3.5.3. #FeesMustFall

Before 2015, South African universities compensated for declining subsidies by increasing their Tuition Fees above inflation (see section 4.2.) resulting in the Fees Must Fall 2015 movement (#FeesMustFall). The outcome of the #FeesMustFall protests was a 0% increase in the 2016 Tuition Fees and the beginning of the end of the autonomy in fee setting universities enjoyed up to this point (Bond, 2015; Editorial, 2016a, paras 1–6; Heher, 2017, pp. 13–17). The South African Minister of Higher Education, Science and Technology further announced that universities can apply discretion regarding their Tuition Fee increase for 2017 and 2018 but that it was capped at 8%, with a cap of 5.3% applied for 2019. For families with a combined household Income of less than R600 000, 2017-2019 Tuition Fee increases were 0% (Bond, 2015, para. 5; Editorial, 2016a; Heher, 2017, pp. 13–17; Koornhof, 2020, para. 15; Wangenge-Ouma and Kupe, 2020, p. 4). The 2016, 0% increase resulted in a shortfall of R2.3 billion for universities (Editorial, 2015, para. 1; Crous, 2017, p. 4). Added to this shortfall was infrastructure damage due to the 2015 protests of over R800 million combined for all universities (Editorial, 2016b, p. 1; Staff writer, 2016, p. 1). The R2.3 billion shortfall South African universities were faced with resulting from the 2015 protests had to be funded by the South African National Treasury, together with the DHET, other Government Departments and from the individual universities' reserves (Editorial, 2015, p. 1; Smit, 2016, p. 889; Crous, 2017, p. 4). According to the Council on Higher Education (CHE) (2016, p. 4), 19 out of 26 public universities in South Africa could have become financially unstable in 2018 if the 0% fee increase from 2016 had been carried over to 2017.

Even though the 0% increase in Tuition Fees did not continue past 2016, universities' financial pressure did not ease up. The announcement of South Africa’s Minister of Finance during the 2020 Budget speech of a restricted government allocation to higher education is an indication that this pressure will also not ease up any time soon (Burger and Petersen, 2021, para. 1). The financial pressure universities face and will continue to face is an outcry to university management. University management will have to take serious action to manage the disruption these institutions face to ensure the survival of South African traditional universities. In addition to the financial threat to the survival of traditional universities, the future of these organisations is uncertain as a result of the possibility that they teach outdated skills, since the 4IR requires a skillset different to the traditional skills taught at universities. This relevance of traditional universities is explored in more detail in the next section.

3.6. Relevance of traditional universities

When focusing on the higher education landscape, the disruptions mentioned in this study affect traditional universities to the greatest extent (Serfontein, 2019, p. 38). A traditional university focuses primarily on teaching and research with the additional task of performing public service (Perkins, 1973, pp. 3–12; Etzkowitz *et al.*, 2000, p. 313; Walton and Martin, 2004, p. 11; Bikse *et al.*, 2016, p. 76). A further characteristic of a traditional university is that it delivers face-to-face and on-campus tuition, separating itself from distance or online education to passive recipients (Mackeogh and Fox, 2009, p. 147; Long, 2012, p. 60). Other characteristics of traditional universities include openness to access, sponsorship of research, education-focused, independence and scholarly activity evidence (Walton and Martin, 2000, p. 8, 2004, p. 11).

When considering the impact of the disruptions mentioned in this chapter, the 4IR is one of the most severe disruptions universities must address that was expedited as a result of the COVID-19 pandemic. Universities are threatened by evolving into archaic institutions, offering irrelevant programmes to future graduates if they fail to adapt to the advances of the 4IR (Coetzee *et al.*, 2021, p. 1). Forming part of the challenges universities face surrounding the 4IR, is that universities should ensure that they have sufficient resources to adapt to the demands of the 4IR (Yang *et al.*, 2018, pp. 224–225).

The 4IR is characterised by an organisational environment that applies technology to develop new business models that require a variety of skillsets, challenging and disrupting traditional ways of thinking and doing things (Wangenge-Ouma and Kupe, 2020, p. 1; Coetzee *et al.*, 2021, p. 1). Equipping students as the workforce of tomorrow to meet the changing demands of the marketplace requires the fundamental rethinking of current curricula, accelerated by the COVID-19 pandemic (Coetzee *et* *al.*, 2021, p. 1). A rethinking of the current curricula is critical since, according to one estimate, around 50% of the knowledge acquired in the first year of a four-year technical programme is outdated when the student graduates. A further estimate is that 65% of the children entering primary school today will one day work in a job that does not yet exist (Coetzee *et al.*, 2021, pp. 1–2). Universities must respond to the disruption caused by technology and the resulting 4IR by focusing on improving the employability of graduates by providing them with the relevant skills required to ensure their employability. To send graduates into the workforce with the ability to meet the requirements set by the 4IR, universities will have to introduce new modules at a rate that meets the speed at which the work environment is changing. However, there is a lot of pressure on universities to commit their resources to reskill (or rather upskill) the Science, Technology, Engineering and Math (STEM) skills of incoming students (Coetzee *et al.*, 2021, p. 3).

The disruption caused by advances in digital technology increased the demand for skilled labour, whilst reducing or even eliminating the need for lower-skilled labour. This phenomenon is known as skills-biased technical change (SBTC). SBTC is characterized by the automation of routine tasks, replacing workers in these tasks whilst enhancing the value of jobs in advancing technologies such as data visualization, rapid prototyping, high-speed communications, and analytics. SBTC has also been labelled "*the race between education and technology*" (Brynjolfsson and McAfee, 2011, p. 28). Organisations are increasingly investing in education, suggesting that the demand for upskilling has increased faster than the supply, even though education is by no means synonymous with skill (Brynjolfsson and McAfee, 2011, p. 28). The demand for skills has recently taken on a U-shape, with the need for middle-skill workers decreasing. Lower skills that demand physical coordination and sensory perception, such as hairdressers or gardeners, resist automation to a higher degree than basic information-processing jobs like bookkeepers or bank tellers. This occurrence is labelled Moravec's Paradox (Brynjolfsson and McAfee, 2011, p. 33). Everyday examples of automated jobs include robot bank tellers, airport ticket machines, routine clerical work and even call centres. In contrast to the skills that can easily be automated, locomotion, vision and fine motor skills have been far more complex to automate (Brynjolfsson and McAfee, 2011, p. 33).

The future skill set required by graduates is a fusion of hard skills (associated with technical knowledge) and soft skills (including social, emotive, and abstract dynamics) (Coetzee *et al.*, 2021, pp. 3–4). The skills identified as crucial to employability in a labour market dominated by the 4IR include collaboration, creativity, critical thinking, and communication. These skills were termed the four Cs by Rodney-Gumede (2019, para. 3). In addition to the four Cs, available literature adds complex problem-solving, people management, emotional intelligence, coordination with others, decision-making and judgement, negotiation, service orientation, management of information and cognitive flexibility (Rodney-Gumede, 2019, para. 4; Coetzee *et al.*, 2021, p. 3).

Focusing on subject areas, some of the topics or skills identified as relating to preparing graduates for the 4IR are financial technology, business analytics and data science. To be more specific, these topics include management, technology, analysis and dissemination of data and information (including coding), simulation, programming, machine learning, digitalisation, big data, robotics, blockchain, AI, IoT, etc. (Coetzee *et al.*, 2021, p. 5). The focus of the 4IR is clearly the extensive use of technology and students will require exposure to ethics to deal with additional threats that could follow this increased use of technology. Students will also need to adopt a lifelong learning mindset, not merely studying technical skills that technology will perform in the future (Gray, 2016, para. 4; Coetzee *et al.*, 2021, pp. 9–10).

According to South Africa's Minister of Higher Education, Science and Technology, only 11 out of 26 South African public universities currently offer modules and programmes related to the 4IR, like robotics and AI (Editorial, 2019a, para. 3). Most universities do not provide students with the necessary skills to navigate the 4IR. Providing the correct skills through content is critical when considering the careers highlighted as relevant because of the changes in the global business environment.

3.6.1. Relevant careers

The modern business world faces a challenging time to compete with machines (Brynjolfsson and McAfee, 2011, p. 36). However, as stated in the previous section, not all human skills will become obsolete. The following section looks in more detail at the careers that will not easily be subject to automation soon.

Some human skills are now more valuable than ever (Brynjolfsson and McAfee, 2011, p. 9). Unfortunately, some skills have been rendered worthless; for graduates, the risk lies in the lack of employability if they are equipped with the wrong skills (Brynjolfsson and McAfee, 2011, p. 9). This risk is confirmed by employment statistics that reflect that employees with the wrong skills are *"losing the race against the machine"* (Brynjolfsson and McAfee, 2011, p. 9). If universities are not going to equip students with the skills required in a world increasingly affected by automation, universities will lose their relevance and graduates will lose their employability.

When considering the skills required to prepare the workforce for the requirements of the 4IR, skills supply has shifted from middle-income manufacturing toward low-income service jobs. It seems as though the manual tasks performed in service occupations are not as severely susceptible to computerization as manufacturing tasks (Frey and Osborne, 2017, p. 255). A further noticeable trend is the increased growth in the demand for cognitive skills, such as problem-solving. This draws an employment picture where middle-income routine job demand is hollowed out and there is a bulging high-income cognitive as well as low-income manual job demand (Frey and Osborne, 2017, p. 255). For universities to remain relevant, they need to equip students with these skills.

A further investigation into skills that will not easily be automated showed that, at this point in time, humanoid robots have poor fine motor skills and tend to fall down stairs, making them unfit as gardeners and restaurant bussers. Many other physical jobs, such as nurses and plumbers, employ significant problem-solving and pattern recognition (Brynjolfsson and McAfee, 2011, p. 18). Computers lack general problem-solving skills with little creative ability. These machines cannot write a novel, compose a song, or generate innovative new business ideas (Brynjolfsson and McAfee, 2011, p. 19). These skills will be in high demand with the 4IR, which means that universities should increase their offering to present the related skills.

Other skills that are difficult to replace through technological developments are complex communication and advanced pattern recognition (Brynjolfsson and McAfee, 2011, p. 17). Complex communication that entails human conversations in emotional, complicated, or ambiguous situations is a skill that is hard to automate (Brynjolfsson and McAfee, 2011, p. 13). An example of complex communication and advanced pattern recognition is a doctor diagnosing a patient by comparing lab results, symptom descriptions and a dose of intuition (termed by Brynjolfsson and McAfee (2011, p.17) as *"advanced subconscious pattern recognition abilities"*). Other careers revolving around skills that are not easily automated include salespeople, therapists, and managers. These careers require communication and interaction with other humans and strategies to gather information whilst influencing behaviour and are considered a complex set of skills (Brynjolfsson and McAfee, 2011, p. 17). Computers are, however, getting better at these skills. One example is the effect of automation in the legal industry, where it is estimated that advances in technology could aid one lawyer to do the work of 500 lawyers (Brynjolfsson and McAfee, 2011, p. 17).

In retail, despite the advanced communication that is required to close a sale, the industry has also seen a large amount of automation, with virtual assistants, self-service machines and kiosks taking over. This take-over is in an industry responsible for the employment of one in ten Americans (Brynjolfsson and McAfee, 2011, p. 18). According to the Vice-Chancellor of the University of Buckingham, teachers in classrooms will be replaced by robots with adaptive learning capabilities within the next ten years (Editorial, 2018a, para. 9). The daunting question is whether any human skill is immune to automation (Brynjolfsson and McAfee, 2011, p. 18).

The disruptions described in this chapter had a significant impact on the higher education landscape as described in this section and in section 3.5. However, disruption forms part of the normal course of business and the organisations that are able to weather disruptions are those that have the ability to effectively react to the disruptions they face.

3.7. Management's reaction to disruption

The effects of the disruption caused by COVID-19 and the eventual expediting of the 4IR is that organisations completely had to rethink their current business strategies (Amato, 2020b, p. 2). The disruptions discussed in this chapter are increasingly experienced in service organisations in the media, banking and airline industries, forcing them to re-examine their existing business models. In response, these industries have adopted new business models, often causing their own disruption in the related industries (Markides and Oyon, 2010, p. 25). Disruption, like the disruption caused by the COVID-19 pandemic, requires that organisations adopt an entrepreneurial mindset focusing on innovation (Amato, 2020b, p. 3). However, many organisations will first focus on survival, spending reserves to make up for a decrease in Revenue (Amato, 2020b, p. 3).

Literature suggests that organisations often struggle to adapt their business strategies to respond to disruptions (Shaw and Chisholm, 2020, p. 2). Decision-makers of organisations faced with disruption are either grappling with recognising the possibilities offered by innovation or shrinking from sabotaging their own profits by the introduction of new product that could displace an existing product (“*cannibalising profit streams”)* (De Jong and Van Dijk, 2015, para. 2). Some even tweak the rules of the game by making small changes to their existing business model here and there, but hardly ever change by implementing a disruptive business model (De Jong and Van Dijk, 2015, para. 2). Organisations struggle with adapting their business strategies, because customers prefer the organisations' old products, technologies, and processes. The organisation might be hesitant to disrupt processes, business models and even profits. An organisation's internal beliefs and frameworks might also cause a delay in the adoption of new technologies and business processes (Markides and Oyon, 2010, p. 25; De Jong and Van Dijk, 2015, para. 2; Shaw and Chisholm, 2020, p. 2).

When considering an organisation running a new (often disruptive) business model together with its original business model, Porter (1996, p. 69) comments that organisations frequently fail, since they are often *"stuck in the middle”* competing simultaneously with both differentiation and low-cost strategies (Markides and Oyon, 2010, p. 26). Unfortunately, Markides and Oyon (2010, p. 26) found that only a handful of organisations were successful with running two separate business models. The successful organisations running two separate business models gave their separate units more financial and operational autonomy. The units within these organisations were also allowed to have their own CEOs and develop their own Budgets and cultures (Markides and Oyon, 2010, p. 31). All indications are that separate business models must be operated from separate units with the freedom to operate in the way they want (Markides and Oyon, 2010, p. 31).

Markides and Oyon (2010, p. 29) researched various organisations' reactions to the historical disruption they faced, clearly illustrating that these organisations' success was running separate business models from separate units. Table 3.1 summarises these examples of disruption and the reactions of the related organisations.

Table 3.1: Examples of reactions to historical disruption

Established Organisation	**Disruptive organisation**	**Response to the disruption**
Continental Airlines	Southwest Airlines	Started a subsidiary to compete in the low-cost airline industry.
Nestlé	Starbucks	Created Nespresso to compete in the "*Home marke*t".
Edward Jones	Internet Brokerage	They decided against internet brokerage and kept to their established business model.
Edipresse	Free newspapers	Established a free, daily newspaper.
Société Suisse de Microélectronique & d'Horlogerie (SMH)	Seiko and Timex	Launched Swatch from a separate unit.
British Airways	EasyJet	Launched GoFly as a competitor in the low-cost airline market.
AXA Investment Managers	Index Trading	Moved to quantitative fundamental equity management by acquiring Rosenberg Group and continued with a hybrid business model.
Guardian Media Group	Online news	They provided free online content by establishing an Internet organisation.

Established Organisation	Disruptive organisation	Response to the disruption
Waitrose	Online distribution	Set up an online division (Waitrose Direct) by a new organisation Ocado to strengthen their competitiveness.
Nintendo	Sony, Microsoft	Created Wii to target a different segment of the market.
Estée Lauder	Body Shop	By developing Origins, they moved into the natural cosmetics market. The acquisition of Aveda helped them to move into the herbal cosmetics market.

Source: Markides and Oyon (2010, p. 29).

From the reactions to disruption in Table 3.1, it is clear that managers need to rethink their business model if they want to navigate disruption effectively. Disruption is, however, increasingly becoming part of the standard strategic planning of organisations (Shaw and Chisholm, 2020, p. 2). According to Shortrose (2020, p. 34), during a crisis (like a disruptive event), CEOs and CFOs tend to focus on eight main risks:

1) Human resources;
2) Internal processes, tools and controls;
3) Liquidity instability;
4) Fraud;
5) Foreign exchange and interest rates;
6) Debt and counterparty risk;
7) Revenue volatility; and
8) Supply chain disruption.

Shortrose (2020, p. 34) further states that it is the role of an organisation's treasury and finance function to address and mitigate these risks. Organisations' response to disruption (and indirectly the risks mentioned) depends on the frequency of strategising by exchanging information between operational and top management, simplified due to time pressure (Netz *et al.*, 2020, p. 3). It is the function of Management and Cost accounting in an organisation to provide the related information required to make the correct decisions in mitigating risks in response to disruption (Drury, 2018, p. 16).

When considering the appropriate response to disruption, an essential plan to follow is to break the rule of the related market when developing a strategy (Markides and Oyon, 2010, p. 29). Insiders in industries that were disrupted that succeeded in navigating disruption followed the following process (De Jong and Van Dijk, 2015, para. 8):

1) Determine the dominant business model in the related industry, including what the core beliefs are about value creation;
2) Dissect the most essential belief into the notions supporting the related industry's most dominant business model;
3) Reframe an underlying belief;
4) Apply a sanity test to the reframed belief; and
5) Turn the reframed belief into the organisation's updated business model.

Disruption is the time to stop doing things that do not propel the organisation towards a desired future, such as business lines or products that exist simply because they have always been there (Amato, 2020b, p. 4). If a big company can overcome its limiting beliefs on doing business as it has always been done, the company, in turn, can become a disrupting company (De Jong and Van Dijk, 2015, para. 30)

3.8. Summary

Globally, organisations have faced various disruptions. Some disruptions changed industries, and some changed the whole business environment. COVID-19 and the resulting acceleration of the 4IR are two disruptive events that had the most recent disruptive impact on organisations globally.

When considering the impact of intellectual commercialisation, COVID-19 and the 4IR on universities, these organisations cannot continue with business as usual. Universities are losing their relevance and are failing their communities, since they do not provide students with affordable, relevant education that will ensure employability.

The move to distance education necessitates an update to the traditional university model of face-to-face and on-campus education. Universities are at the crossroads of survival, losing their competitive advantage based only on being a face-to-face institution closely located to students in a particular geographical environment. The survival of traditional universities is dependent on their ability to differentiate themselves from other sources of education.

However, what is clear is that disruption will keep on increasing since technology keeps on developing at a rapid pace. Technology will significantly impact the economy, skills, and jobs globally. Unfortunately, while technological development and innovation are gaining speed, many organisations are falling behind due to the outdated skillset of their employees. There is an urgent need for the global population to understand the disruption associated with technologies and to develop strategies to deal with this disruption to ensure human workers are racing with, instead of against, machines (Brynjolfsson and McAfee, 2011, p. 10).

To keep up with the fast pace of technological development, an investment in education is required to develop the necessary skills (Brynjolfsson and McAfee, 2011, p. 39). Universities, specifically in South Africa, must provide relevant, affordable education that will ensure employability (Smit and Serfontein, 2019, p. 1332).

Chapter 4 considers the impact of Management and Cost accounting to assist university decision-makers in weathering the disruption they are currently facing. The relevance and employability concepts surrounding university education, specifically in South Africa, are investigated and addressed. Chapter 4 looks in more detail at the unique challenges universities must navigate. The discussion in Chapter 4 includes the Management and Cost accounting tools that could assist the universities' decision-makers in ensuring these organisations' financial sustainability.

Chapter 4 – Management and Cost accounting at universities

> *"We are being afflicted with a new disease of which some readers may not yet have heard the name, but of which they will hear a great deal in the years to come—namely, technological unemployment. This means unemployment due to our discovery of means of economising the use of labour outrunning the pace at which we can find new uses for labour."*
>
> *—John Maynard Keynes.*

Source: Keynes (1931, chap. v).

4.1. Introduction

The optimal use of scarce resources to obtain the primary goals of an organisation has never been more critical. The current problems of increasing costs, strikes, unproductivity, lack of funding and specifically government funding, the rapid changes in markets, technology and business environments, economic recessions, and the impact of COVID19 have created a disruptive environment for most organisations and specifically for universities.

Classic economic theory suggests that higher education is a public good and required for economic development (Smelov *et al.*, 2018, p. 35). However, in a time of decreasing government Budgets, the relationship between the quality of teaching and research conducted at public universities and the funding of these activities is an essential, though controversial, discussion (Kudła *et al.*, 2016, p. 89).

A higher education institution is customarily a multi-product organisation, subject to public regulation and does not have a profit motive (Nemoto and Furumatsu, 2014, p. 213). These organisations typically do not invest in capital based on criterium of maximising profit (Nemoto and Furumatsu, 2014, p. 213). As multi-service organisations, universities offer diverse services namely teaching, research and community service (Bowen, 1980, p. 115; Alejandro, 2000, p. 36).

Some literature supports a view that universities, like any organisation, produce commodities in the form of research and literature (Aspromourgos, 2012, p. 44; Agyemang and Broadbent, 2015, p. 1022). Universities, therefore, must satisfy their customer base that includes students, employers, and funding and research councils (Agyemang and Broadbent, 2015, p. 1022). From this viewpoint, universities have an obligation to be run efficiently. Apart from the increased pressure to be more efficient, universities must also remain relevant in the modules they offer (Serfontein, 2019, p. 5). Relevance in the South African context is to deliver affordable higher education that will ensure employability (Smit and Serfontein, 2019, p. 1332).

One example where the relevance of modules often sacrifices the efficiency of universities is the academic core. When looking at what is described as "*the academic core*" by Fethke and Policano (2012, p. viii) basic sciences, humanities and liberal arts have experienced a decline in public support whilst facing pressure to accommodate more students. These students are often not sufficiently prepared because of poor secondary schooling (Fethke and Policano, 2012, p. viii). The academic core now has to do more with less resources. Universities faced with a similar situation have to apply resources more efficiently, i.e. delivering increased output whilst lowering input.

When considering efficiency, the Great Recession that started in 2008 continues to put financial pressure on the Budgets of most academic programmes that are government subsidised. Unfortunately, the cuts in government subsidy of academic programmes are not temporary, but are more likely the foreshadowing of the end of the era of high government funding and low tuition university funding models. Even though Tuition Fees have increased, the increase is not sufficient to cover the gap left by decreases in government funding (Fethke and Policano, 2012, p. viii). The result of the decline in government funding is that universities cannot support a financing structure of cross-subsidisation of high-cost-low-income programmes (Oduoza, 2009, p. 133; Fethke and Policano, 2012, p. viii). "*Ultimately, public universities cannot be all things to all people*" (Fethke and Policano, 2012, p. 16). The decreased funding of universities whilst supporting increased student numbers caused severe structural changes to the university sector, leading to increased costs in their attempt to assess their research and teaching quality. Fortunately, the consequences of these structural changes were an increased focus on the financial management of these institutions and the role of the financial manager (Oduoza, 2009, p. 133).

Universities will have to make decisions regarding their current business model to become more efficient (Saladrigues and Tena, 2017, p. 118). This improved efficiency relies on information regarding the costs and Income for university departments and modules together with Activity-Based Cost and Income analysis and efficiency indicators of the various activities run by a university (Saladrigues and Tena, 2017, p. 118). Apart from efficiency, universities must also remain relevant. To stay relevant and meet increasing student demands, universities must align the resources they use to affordable pricing. Modules are the building blocks of university programmes, comprising different numbers of credits and varying enrolments, presented from various faculties (Serfontein, 2019, p. 5). Modules will require an associated cost to achieve affordability and aid decision-makers to make informed decisions (Serfontein, 2019, p. 5).

One of the main functions of Management and Cost accounting is providing relevant and accurate information to assist organisations in their decision-making process (Drury, 2018, p. 16). It is possible that in time, the Management and Cost accounting system of an organisation starts reflecting the related organisation's culture (its thinking and acting). The applied Management and Cost accounting system practices have become the accepted way to do things enabling organisations to make decisions and act upon these decisions in a world full of complexities and uncertainties (Scapens, 1994, p. 301). Therefore, it is of considerable importance to study the application of Management and Cost accounting with specific reference to service organisations delivering an intangible cost objective similar to universities.

This chapter will explore the application of Management and Cost accounting practices at universities. To understand how Management and Cost accounting is applied at universities, it is critical to explore the Income structure of universities. The Income structure of a university provides insight into the cost objective it delivers as a service organisation. The cost objective described (see section 4.3.) is applied in this chapter to understand how universities benefit from applying Management and Cost accounting, with a focus on the decision-making function of publicly funded universities, which is critical in the light of the disruption these organisations face as, described in Chapter 3. The Management and Cost accounting concepts and practices discussed in Chapter 2 are explored further in this chapter focusing on the application of these practices in the complex university setting of diverse service delivery. From the disruption discussed in the previous chapter, it is clear that universities have to rethink both ‘What’ and ‘How’ they teach and make the necessary decisions to ensure the sustainability of these organisations.

4.2. Funding of South African universities

Public universities in South Africa receive Income from mainly three streams: a) Block and earmarked grants (Government Subsidies and Grants), the primary source of funding currently; b) Tuition Fees; and c) Third-stream Income (i.e. contract research, consultations, donations, etc.) (PwC South Africa, 2016, p. 1; Heher, 2017, p. 257; Koornhof, 2020, para. 6; Naidu and Dell, 2020, para. 34). Significant changes to the funding of universities often occur due to societal and economic trends. These trends include substantial changes to levels of government subsidy and other government funding aimed at higher education, the growing vulnerability of families in the poor and working-class social strata and the challenges in obtaining Third-stream Income. Changes to the levels of government funding and the amount of Third-stream Income universities obtain impact the stability of university resources. When universities’ resources are unstable, universities' organisational exposure occurs, compromising financial sustainability and threatening organisational stability (Wangenge-Ouma and Kupe, 2020, p. 3).

South African universities’ resources have experienced pressure because of the higher education system growing *“aggressively”* in terms of increases in student numbers (Koornhof, 2020, para. 7; Mtshali, 2020, para. 19). The public higher education sector in South Africa comprises 26 universities. In 2010, 892 936 students were enrolled in these universities. This figure increased with 20.4% to 1 074 912 in 2019 (DHET, 2021b, p. 9). Usually, increases in Revenue are an excellent thing. Ironically, some service organizations, such as universities, did not benefit from increasing student numbers and, even worse, from technology, to become more efficient. Over the last decade, Tuition Fees have increased more than inflation (Smit and Serfontein, 2019, pp. 1–2). The consequences of this phenomenon are that higher education became more expensive to students, leading to increasing levels of university Subsidies and Grants in many countries, thus increasing the burden on government funding (Editorial, 2020f, para. 4; MacGregor, 2022, para. 46).

In terms of real-term per capita growth in Block Grants, as indicated in the last column of Table 4.1, South African universities have historically been underfunded, specifically for the period 2006/07 to 2014/15 with primarily negative or zero per capita growth in real terms. The DHET (2015, pp. 4–5) used the Block Grant to South African universities as a measure of government subsidies and FTEs as a measure of growth in student enrolments to calculate the Block Grant per FTE after taking inflation into account (see last column in Table 4.1).

Table 4.1: Block Grant allocations to universities from 2004/5 to 2014/15

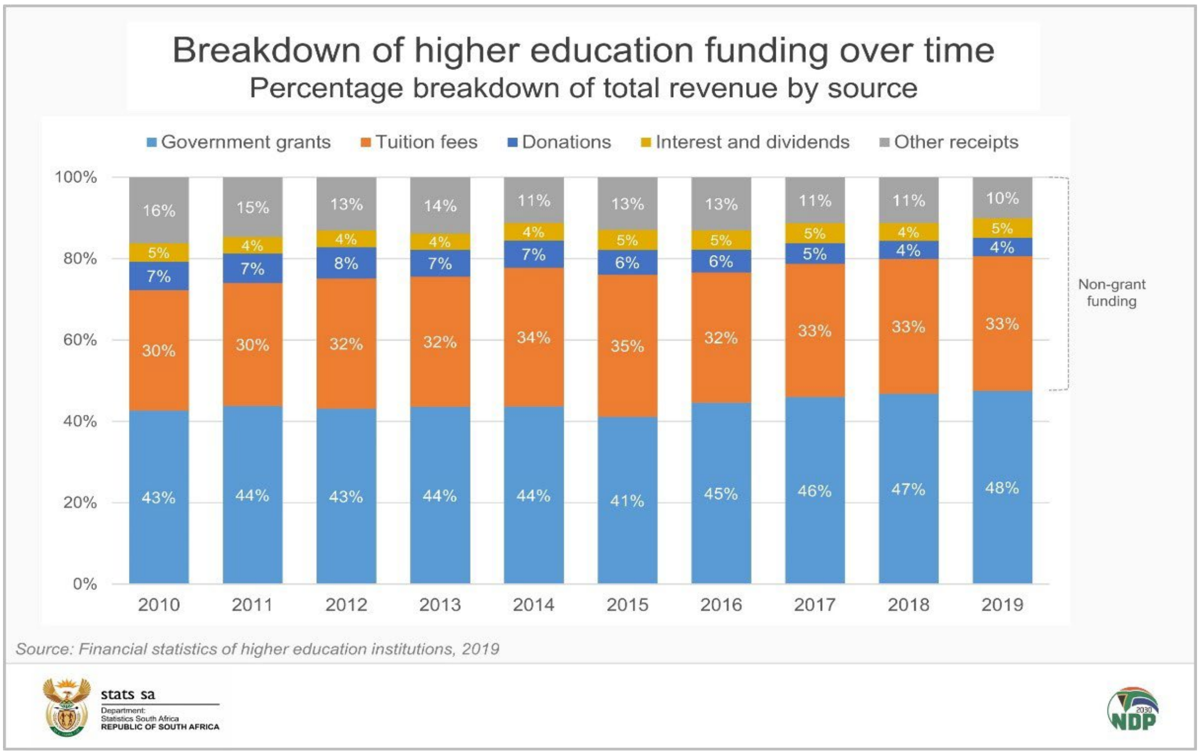
Year	Block grant for universities in nominal terms (R 'million)	Growth in nominal terms	Inflation	deflator (B)	Block grant for universities in real terms (R 'million)	Growth in real terms (%)	HEMIS Student FTEs	Per capita in real terms using FTE students (Rands)	Per capita growth in real terms (%)
	(A)	(%)	(CPI)*		(C) = (A/B)		(D)	(C/D)	
2004/05	8,568	-	2.0%	1.00	8,568	-	505,473	16,950	-
2005/06	9,145	6.7%	3.6%	1.02	8,966	4.6%	500,931	17,899	5.6%
2006/07	9,956	8.9%	5.2%	1.06	9,421	5.1%	497,772	18,926	5.7%
2007/08	10,234	2.8%	8.1%	1.11	9,205	-2.3%	518,560	17,751	-6.2%
2008/09	11,550	12.9%	11.2%	1.20	9,614	4.4%	538,457	17,854	-0.6%
2009/10	12,701	10.0%	6.9%	1.34	9,511	-1.1%	569,708	16,694	-6.5%
2010/11	14,533	14.4%	3.8%	1.43	10,176	7.0%	600,002	16,960	1.6%
2011/12	16,387	12.8%	5.6%	1.48	11,051	8.6%	628,409	17,586	3.7%
2012/13	17,434	6.4%	5.6%	1.57	11,134	0.7%	634,548	17,546	-0.2%
2013/14	18,439	5.8%	5.8%	1.65	11,151	0.2%	665,856	16,747	-4.6%
2014/15	19,561	6.1%	5.6%	1.75	11,181	0.3%	668,705	16,721	-0.2%
Net % change in nominal terms in block grant from 2004/5 to 2014/15		128.3%	**Net real change in block grant**			30.5%	**Net change in per capita FTE student allocation**		-1.4%

Source: DHET (2015, pp. 4–5).

Although the author does not necessarily regard FTEs as the ideal measurement of enrolment growth at universities, it is a satisfactory measure. Based on the last column, in real terms, Block Grants per FTE declined overall from R18 926 in 2006/07 to R16 721 in 2014/15, putting pressure on universities to sustain their Revenue by increasing Tuition Fees above inflation. In keeping up with the increase in student enrolments and declining subsidies, Tuition Fees increased annually by 9% between 2010 and 2014 (Swartz *et al.*, 2019, p. 571), which is much higher than the annual inflation rate. Since 2015, South African universities have experienced annual shutdowns due to rising Tuition Fees, making higher education inaccessible for the majority of South Africans (Swartz *et al.*, 2019, p. 572). The #FeesMustFall campaign that started in October 2015 ended the exponential increases in Tuition Fees by universities in South Africa as compensation for declining subsidies (Editorial, 2020f, para. 2; Koornhof, 2020, paras. 14–15). From 2007 to 2015, government funding declined as a portion of total university Revenue, widening the gap between state-funded and non-state funded Income.

From 2015, the gap narrowed again with a noticeable acceleration of government funding, with non-state funding slowing down (Editorial, 2020f, para. 8). Figure 4.1 presents the Revenue streams of South African higher education institutions for the period 2010-15 as opposed to 2015-19. Government Grants declined from a high of 44% in 2011 to a low of 41% in 2015 as a percentage of Total Revenue at South African universities. For the same period, Tuition Fees increased from 30% in 2011 to 35% in 2015 (more than the decline in Government Grants). The opposite happened for the period 2015 to 2019, with Government Grants increasing from 41% to 48% of Total Revenue in 2019, while tuition Revenue declined by only 2 percentage points from 35% in 2015 to 33% in 2019. Although Government Grants improved quite substantially as a percentage of Total Revenue from 2015 to 2019, Wangenge-Ouma and Kupe (2020, pp. 3–4) are of the opinion that, given the economic challenges experienced currently in South Africa, these relative increases in Block Grants are not sustainable.

Figure 4.1: Breakdown of higher education funding over time



Source: Editorial (2020f, para. 10).

In countries with predominantly poor students, such as South Africa (SA), the primary function of South African universities should be to provide affordable education to ensure employability (Smit and Serfontein, 2020, p. 30). Figure 4.1 indicates that in most cases, universities failed to provide affordable education over the last nine years up to 2019. The previous two years (2020 and 2021) were intentionally not considered for this study because COVID-19 could distort the results.

Although South African public universities deliver primarily face-to-face teaching, an online presence is rapidly becoming an essential requirement (Coetzee *et al.*, 2021, p. 8). The 4IR was fast-tracked by COVID-19, forcing universities to present online rather than face-to-face classes, thus eliminating the geographical competitive advantage of traditional universities (refer to section 3.8.). The increase in top universities globally presenting online courses (modules) to an international audience, often for free, is not a new phenomenon and was noticed by Long (2012, p. 58) in 2012 already. An online presence could provide an additional Revenue stream, especially considering decreased funding from the government, shifting the financial burden to students (Coetzee *et al.*, 2021, p. 8).

If also taken into account that the 4IR is rapidly changing the skills and knowledge students need to be employed (refer to section 3.6.), the changing skills and knowledge increase the pressure for traditional universities to adapt or die (Hattingh, 2016, p. 1; Menon and Castrillon, 2019). Historically, universities have been notorious for adapting too slowly to the changing need for new skills required in the market, increasing the conundrum of relevance and survival universities face (Hattingh, 2016, p. 1; Menon and Castrillon, 2019, para. 3).

A primary concern in establishing an online presence is the availability of labour and physical resources. Universities will have to avail the required funds to provide training and resources to adopt an online presence, even if a hybrid teaching approach is followed. Availing these funds is no easy task. It requires the application of Management and Cost accounting tools to aid in the decision-making at these organisations. However, the availability of accurate cost information regarding the cost objective at a university is further complicated by the fact that universities deliver a service, with the most important characteristic the intangibility of the cost objective delivered (Kamal Basha *et al.*, 2015, p. 173; Serfontein, 2019, p. 6).

4.3. Service delivery at traditional universities

The application of Management and Cost accounting has a history of being viewed as a specified function in the manufacturing industry. The service industry tends to place a lower emphasis on adopting mature Management and Cost accounting systems (Patil and Kshatriya, 2016, p. 47). This lower emphasis limits research on estimating the cost of services (Huang *et al.*, 2012, p. 418). Similarly, the cost information required to apply Management and Cost accounting at a university is not readily available (Cook, 2003, p. 1). In other words, *"[t]he most significant problem faced by most universities is that they do not know much about their costs*" (Moore, 1998, p. 7).

When considering the costs incurred at a university by applying Management and Cost accounting, a critical factor to consider is that the three dimensions of a university's service (research, teaching, and community service) are Joint products. These services are inseparable (Aspromourgos, 2012, p. 46).

The inseparability of services leads to Joint costs. The biggest portion of the costs incurred at universities is Salaries paid to staff providing services on all three dimensions of service delivery at the university (i.e. teaching, research and Third-stream), a Joint cost. Assigning these costs to a specific Income stream is complicated, with literature suggesting that the assignment of Joint costs is "*at best arbitrary"* (Bowen, 1980, p. 98; Terzioglu and Chan, 2013, p. 34; Serfontein, 2019, p. 9).

Salerno (2006, p. 283) explains that Joint costs occurred in almost all major cost centres at a university and highlighted three conventional methods to apportion these costs to education-related activities. The first approach is to ignore Joint costs and regard all education and research Expenses as part of the cost incurred in providing undergraduate education (Salerno, 2006, p. 283). This method might be regarded as overly simplified; the more widely used method is to use the time reported by faculty as the time spent on education-related activities as the norm for the use of all other resources (Salerno, 2006, p. 283). The third method to allocate resources to the different Income streams at universities is to consider the total portion of university expenditure related to educational activities and regard this percentage as the educational usage of all shared resources (Salerno, 2006, p. 284). All three of the mentioned methods run the risk of inaccurate allocation due to bias and inefficiencies in the measures used in the allocation (Salerno, 2006, p. 285).

When considering universities as service organisations, Oduoza (2009, p. 137) points out that Overhead allocation in higher education institutions could pose a problem. The problem with Overhead allocation in higher education arises because most costs incurred by these institutions constitute costs from support services provided centrally, including (but not limited to) library services, and administrative and computing support services. If a university wants to identify cross-subsidisation, a cost centre's full cost must be determined, necessitating allocating centrally provided support service costs (Oduoza, 2009, p. 137). However, according to Lewis and Pendlebury (2002, p. 36), many higher education institutions do not even attempt any form of central support service cost allocation. If the central support service cost is allocated arbitrarily, measuring cross-subsidisation focusing on central support service cost will be of limited significance, relevance and accuracy (Oduoza, 2009, p. 137).

This inseparability of costs and the range of services delivered by universities complicate the application of Management and Cost accounting to enable the costing of a university’s cost objective (Bowen, 1980, p. 115; Alejandro, 2000, p. 36). For this study, the cost objective under consideration is the academic activity taking place at a university. All academically related costs will be considered as Direct costs (academic costs) and all other costs will be considered Indirect costs (Overheads). Finding effective Management and Cost accounting tools applicable to service organisations, more specifically service organisations delivering a variety of services like universities, seems daunting.

4.4. Universities and Management and Cost accounting

Universities are experiencing increased levels of competition and require improved efficiency (Saladrigues and Tena, 2017, p. 118). A university’s efficiency is dependent on its ability to extract maximum benefits from limited resources (Serfontein, 2019, p. 5). Therefore, Management and Cost accounting has become vital for universities to increase their focus on implementing cost analysis (Saladrigues and Tena, 2017, p. 118). However, the lack of efficiency amongst South African universities forced them to increase both enrolments and Tuition Fees to survive financially (Editorial, 2020f, para. 10). These Tuition Fee increases violated affordability, ending in universities enrolling students in modules and degrees that do not necessarily ensure employability. This discrepancy between students graduating from a university and not being employed is seen in the current high graduate unemployment rate, as discussed in section 3.4. It is quite easy for researchers to refer to the problems faced at universities regarding graduates and their employability, but very few contribute to the solution. One possible explanation could be provided using Management and Cost accounting guidelines. Organisations utilise Management and Cost accounting systems to evaluate performance, control efficiency and determine product costs (Kajüter and Schröder, 2017, p. 71).

When considering the implementation of Management and Cost accounting in a service organisation, it is important to remember that a typical service organisation is characterised by predominantly fixed and Indirect costs (Overheads) and low levels of variable Direct costs (taking the final product or service as the cost objective). There is, however, an advantage attached to the high levels of fixed costs in service organisation. According to the behaviour of fixed costs, the organisation benefits if the Revenue increases, but if Revenue decreases, the impact on the bottom line is severely impacted (see section 2.6.). This phenomenon is because only variable costs are related to rendering the service or generating Revenue, implying a relatively small change in costs if Revenue increases and vice versa. The implication for traditional universities is that, given that they are service organisations, if Revenue decreases as a consequence of the 4IR, or they have lost their competitive advantage because of increasing online enrolments and free international higher education, the financial survival of these traditional universities could be at risk.

The application of Management and Cost accounting could assist in addressing the financial survival of universities since it allows for increased efficiency regarding planning, decision-making, and control (Saladrigues and Tena, 2017, p. 119). Unfortunately, the accounting rule universities apply to register their business transactions (to prepare Financial Statements) do not provide sufficient information to measure performance at universities (Kostić *et al.*, 2019, p. 132). Accounting systems do not allow transparency in the presentation of the different Revenue streams of universities, the shrinkage or growth of administrative functions, the cross-subsidising of functions or differences occurring between disciplines (Kostić *et al.*, 2019, p. 132). A separate Management and Cost accounting system is, therefore, critical. The efficiency brought about by implementing a Management and Cost accounting system is primarily thanks to the data produced by such a system (Saladrigues and Tena, 2017, p. 119). The primary function of creating new information systems at universities is to continually assure the financial health of universities in their quest to meet the challenges of an evolving environment (Moore, 1998, p. 100).

One of the cost accounting tools used by faculties at some universities analysed in a study by Fabre (2013, p. xv) is a profit-and-loss account for each course setting out the course's specific Income and Expenses, utilising lesson hours as a measuring unit for both Revenue and spending. In applying such a profit-and-loss account, one of the problems encountered is how to distribute Joint costs and Income effectively. These profit-and-loss accounts for individual courses could be consolidated for each department and provide a valuable negotiating tool for deans. If the cost per student appears high, it indicates a malfunction, for example, an overloaded curriculum with few enrolments (Fabre, 2013, p. xv). The aim here remains to determine some form of "*Direct cost margins*". The main Direct Expense of the operational units of faculties (departments) remains the fees of teaching staff. Direct Income would refer to all Income that can be directly allocated to the related faculty, such as the allocation from the university's presidency and other Third-stream Income. Making decisions on these direct Income and Expense items will affect other costs. If, to cut costs, lessons are pooled together, teaching hours are reduced, but the planning process surrounding these pooled lessons are sometimes excessively complex, which could require additional staff to manage this process without seeing the direct benefit. This is one example of the limitation of the suggested tools representing simplified activities due to the departments not having the time or human resources to implement more sophisticated tools. The objective of these tools is also to lean more towards negotiation, which means the information must be easily understood by all stakeholders involved (Fabre, 2013, p. xv).

From the perspective of universities, with the ever-changing higher education landscape and increasing pressure to extract the maximum output from limited resources, the management accountant at a university's role is to develop new approaches to providing information (Moore, 1998, p. 100). Management and Cost accounting is a system to measure the financial resources required to produce a cost objective more accurately (Mohr, 2016, p. 616). The more accurate measurement of financial resources is because the application of Management and Cost accounting tools enables the consolidation of overspending and increases stakeholders' awareness of the overspending (Fabre, 2013, p. xvi). Management and Cost accounting tools are also essential in the decision-making process as required by deans of faculties (Fabre, 2013, p. xx). These tools protect university decision-makers against pressure from internal politics since it provides a logical framework for the distribution of resources limiting decision-makers' autonomy in deviating from the set framework (Fabre, 2013, p. xxiii).

4.5. Universities and decision-making

Universities must be run like businesses to remain financially viable (Saayman, 2020, p. 2). A serious question a university must consider is whether its business model is flexible enough to adapt as circumstances evolve (Koornhof, 2020, para. 28). There is a general proclamation that the key to enhanced educational value lies in improving efficiency and reducing costs (Fethke and Policano, 2012, p. 34).

Possible cost-cutting solutions to improve efficiency suggested by the Executive Director of Finance and Student Administration at the University of Pretoria include considering environmental sustainability to enable the university to be more energy sufficient. Other examples of increased efficiency are shared business services, including Information Technology (IT), with universities in the same area, bolder fundraising and exponential increases in research funding (Koornhof, 2020, paras 30–31).

Another possible way to improve efficiency is to increase student enrolments. Universities should have been able to increase their upper limit for the number of students by utilising the technological advantages of the modern business environment as predicted by the 4IR, but this advantage does not seem to realise. One reason is the slow pace of embracing change as is characteristic of higher education (Hattingh, 2016, pp. 1–3; Menon and Castrillon, 2019, para. 3). Changing in response to external factors takes time at a university (Fethke and Policano, 2012, p. 14). In addition to the slow pace of change at universities, some universities do not have the physical capacity to enable an increase in student numbers (Saayman, 2020, p. 2). Universities are also known for their culture of treating everybody's preferences and requests equally and preserving the status quo not necessarily focusing on enhancing efficiency (Fethke and Policano, 2012, p. 14). However, programmes lacking a logical financial model that does not offer any distinctive features and do not align with the purpose and viability of the university are at risk of being downsized or even eliminated (Fethke and Policano, 2012, p. 16). If administrators at a university decide to stop presenting a specific master's course, they will first lose the Revenue received from students. Additional costs of offering this course will be saved. Fixed costs, in this case, are irrelevant. Examples of these fixed costs are rent and maintenance for university buildings, which will continue to be incurred, even if the course is stopped (Nisha, 2016, p. 4). Although the argument of 'fixed costs are irrelevant' makes sense, it is the opinion of the author that by stopping a 'specific master's course' could, at the same time, lead to better utilisation of scarce resources, hence increasing the input-output relationship and minimising the levels of cross-subsidising a lossmaking course.

However, Adams (2020, para. 4) is of the opinion that universities will only be able to recuperate the losses incurred by certain courses if they significantly decrease their staff numbers (Adams, 2020, para. 4). According to Middaugh (2005, p. 15), reducing the number of faculty members whilst increasing the number of courses these members teach as a measure to decrease instructional expenditure at universities is extreme. Such a measure assumes that faculty members perform no activities other than teaching, whilst ignoring that universities' spending pattern is linked to the choices exercised by organisations based on their mission (Middaugh, 2005, p. 15). The option to decrease the number of faculty members is a viable option but optimising the input-output relationship would increase efficiency in a much more financially sustainable manner. In a study at one South African university, it was established that only 50% of the modules presented cover 100% of the Indirect costs with more than 49% of the modules not even covering their Direct cost (Serfontein, 2019, p. 158).

When considering the financial viability of universities and the changes brought about by the COVID-19 pandemic and other disruptions as discussed in Chapter 3, it is clear that universities will have to invest resources to train faculty members to effectively utilize technology in their teaching to stay up to date on the developments of the 4IR and remain competitive with MOOCs and online universities. At various universities all over the globe, the number of enrolled students is already declining due to students preferring online over traditional university education and online education linking up with employers (Davies, 2012, p. 66; Ostashewski, Howell and Dron, 2017, p. 184; Shah, 2018, para. 1). Universities lagging in their reaction to the technological threat of COVID-19 and the 4IR will be forced to change their business model dramatically to avoid a decline in their student enrolment numbers (Davies, 2012, p. 65). However, implementing the required changes to the business model of universities requires relevant and accurate data that could be supplied by the effective application of Management and Cost accounting.

4.5.1. Cost calculation at universities

"*In higher education, is it worse to know the cost of everything and the value of nothing, or the cost of nothing and the value of everything?"* (Balderston, 1974, p. 93). This question asked by Balderston (1974, p. 93) in 1974 remains relevant to this day, especially in an environment with limited financial resources, Budget cuts, and increasingly competitive external financing as applicable to universities. In this university environment, the optimisation of financial resources can only occur if the programmes' evaluators and administrators understand the costs of the related programmes. This understanding requires an intense analysis of cost behaviour, a routine exercise in the business sector but underutilised in all other sectors (Persaud, 2020, p. 1). However, cost accounting is not mandatory for universities and, more specifically, departments at universities (Fabre, 2013, p. xiv). Therefore, estimating the cost of the provision of higher education has proven challenging because of non-uniform accounting procedures at various universities complicating the isolation of relevant labour and non-labour costs, as well as a failure to distinguish properly between relatively expensive programmes such as physical or life sciences versus social sciences and humanities (Salerno, 2006, pp. 281–282). On a global scale, the cost per course is unknown. The cost per student on each course is also not available (Fabre, 2013, p. xiv). Cost analysis is, therefore, a critical Management and Cost accounting tool at universities.

Cost analysis has four functions at a university: 1) Managerial and operational uses within the organisation; 2) Provision of inputs for planning purpose (i.e. making changes to capacity, programme structure and the organisational policies); 3) Enabling the comparison of organisations to aid in collaboration and target setting; and 4) Justification of Tuition Fees and resource requirements to both public and private funding sources (Balderston, 1974, p. 94). Cost calculation and analysis is, however, highly complicated for universities.

One reason for the complication of calculating and analysing costs at universities is the different levels of education (South African context: NQF levels). These different education levels cause different cost levels that are difficult to measure, with costs also differing based on the size of classes. Smaller graduate classes are more expensive per student to present than more extensive introductory courses. Possible productive and cost efficiencies could also cause differences in costs often omitted from attempts to determine costs per student providing ranges of unit costs (cost per student) whilst failing to recognise some of the differences could be as a result of inefficiencies in production processes (Salerno, 2006, p. 282). Another contributing factor to the difficulties in determining the cost per student (especially for undergraduate programmes) is allocating Joint costs. *"There is no pure cause and effect relationship between price (tuition) and cost (what institutions expend in delivering a college education)*" (Middaugh, 2005, p. 8). Costs ranging from those associated with faculty members' time to technology and library resources are inputs to produce various outputs. Determining where these costs must be allocated has a fundamental impact on decision-making influencing higher education (Salerno, 2006, p. 282).

One way to counter the difficulties experienced in university cost calculation is Revenue management (RM). RM is a tool where an organisation focuses on maximising Revenue whilst controlling costs (Maguire and Rouse, 2004, p. 61). Organisations with the following key features will typically benefit from RM:

- The organisation delivers a perishable service;
- The organisation is faced with relatively little flexibility in their capacity;
- The booking or selling of the service takes place in advance of the delivery of the service;
- The demand for the organisation's cost objective fluctuates; and
- Marginal costs in the current capacity are relatively low (Maguire and Rouse, 2004, p. 61).

These criteria can be applied to the service delivered by a university (presenting of modules). A university offers a perishable service since the presentation of a module is restricted to a specific time frame. The university has a fixed capacity with minimal flexibility without significant infrastructural development taking place. Students must register for a module before starting a semester or academic year. The demand for modules fluctuates in line with the economic conditions in South Africa, since this will affect the affordability of university education as well as available funding. The marginal costs for presenting a module is a tiny portion of the total costs of presenting the module, since the most considerable amount of the costs incurred by a university is related to Salaries that behave as a fixed cost and will not really fluctuate with the number of students enrolled in a module (refer to section 2.3.2.5.). RM is, therefore, an applicable Management and Cost accounting tool for universities.

Apart from RM, ZBB , full costing, responsibility centre management and transparent approach to costing are all Management and Cost accounting tools utilised in the higher education sector (Berry, 2014, p. 306). These are alternative costing models to ABC or a simplistic baseline Budgeting system (Berry, 2014, p. 307). Chapter 2 explained these tools in more detail. The focus of this chapter is on academic faculties and departments and the associated problems of Management accounting to address the management of the costs incurred at universities.

The first issue to be addressed is the classification of academic costs. If we look at the primary goal of universities to provide higher education and do research, academic costs are directly related to the primary cost objective. The bulk of these Direct costs comprises Salaries, typically a fixed cost. However, the fact that these academic costs are fixed is directly related to the scarcity of higher teaching and research resources. Therefore, most white-collar workers are usually appointed for at least a reasonable period. In South Africa, labour law does not allow people to be appointed for longer than six months without a medium- to long-term employment contract (Cloete, 2017, para. 3).

Since most costs incurred at universities relate to personnel costs, the biggest portion of the cost incurred by universities is fixed. On the one hand, the fixed nature of the costs at universities poses a risk, since a decrease in funding could have a significant impact the financial position of the university. On the other hand, any increase in marginal Income does not necessarily necessitate the incurring of additional Expenses (Agyemang and Broadbent, 2015, p. 1029). A further classification of the costs incurred at universities is that the intangibility of the cost objective makes the majority of costs Indirect.

4.5.2. Management of Indirect costs at universities

Understanding how Indirect costs (Overheads) are allocated to cost objectives has become increasingly important. New business conditions saw an increase in the cost structure of organisations with Indirect costs' proportion to total cost increasing with changes in production processes as a result of globalisation and the rise in IT usage (Glomazic, 2020, p. 88). When focusing on Indirect costs incurred at universities, the identification of Overheads (service and support department costs) are reasonably straightforward; namely, the costs are predominantly fixed and Indirect to the primary cost objective of the university. However, the management (planning and control) of these Indirect costs is challenging, because there is almost no causal relationship between inputs and outputs.

The potential reason for the inefficiency of universities over the last few decades (not rendering a service more cost-effectively) could be explained by the inability of Management and Cost accounting to improve the management of Overheads (or Indirect costs). For this discussion, Overheads are defined as all costs, excluding the Direct costs of producing or rendering the service. Overheads are also typically fixed costs (refer to section 2.6). However, the definition of a fixed cost often implies a period cost with no direct link to outputs, causing most fixed costs to be also classified as Indirect (Moore, 1998, p. 76; Terzioglu and Chan, 2013, p. 33; Serfontein, 2019, p. 9).

To use a university as an example, if the cost objective is academic output, such as teaching and research, the cost of faculties rendering the service (cost objective) will be regarded as Direct costs (academic cost). In contrast, the cost of service and support departments will be considered as Indirect costs (Overheads) because of the absence of a direct causal relationship. Unfortunately, most of the costs are fixed and/or Indirect in a typical service organization such as universities (Moore, 1998, p. 76; Terzioglu and Chan, 2013, p. 33; Serfontein, 2019, p. 9).

When looking at the majority of costs incurred at universities, i.e. Salaries, the characteristics of specifically Academic Salaries comply with the 'period cost' part of the definition of fixed costs, but not necessarily to the 'no direct link to outputs' part. Typically, academic faculties and departments are treated as Profit centres, implying that their funding depends predominantly on the number of student enrolments in their degrees and modules presented and research outputs (Serfontein and Smit, 2021, p. 176). In contrast, most service and support departments are regarded as discretionary cost centres (refer to section 2.9.1.); thus, their funding is not related to a measurable output or performance. A further problem associated with Overheads is that these costs are often allocated to Profit centres, implying that Overhead costs are typically allocated away from their place of control. In the same way, to be effective, conventional Budgeting requires a clear input-output relationship that does not exist with Overhead related costs.

In the case of a university, the Salaries of academic departments and faculties will be excluded from the definition of Overhead costs, since these costs directly relate to a university's cost objective, i.e. teaching and research (Drury, 2018, p. 411). The cost of service, technical and support departments (including top management) and the cost of running the university (electricity, etc.) will be regarded as Overhead costs. Although the Salaries of academic staff at a university have more fixed cost characteristics, it is almost the only cost that should increase if the number of enrolments increases. Ironically, the most considerable increase was in Overhead costs incurred at the 26 South African publicly funded universities, specifically the Salaries of support, service and technical departments from 2010 to 2019 (see Chapter 6).

It is vital to indicate the magnitude of Salaries at South African universities to establish the acute relevance of this discussion. When considering the financial analysis of the 26 publicly funded South African universities from 2010 to 2019, the results as reflected in Table 4.2 were obtained.

Table 4.2: The portion of Salaries of Total Expenses at the 26 South African public universities

	2015 R million	2019 R million	Growth 2015-2019
Expenses	57,813	79,920	38.2%
Salaries*	31,392	43,763	39.4%
Salaries*/Total Expenses	54.3%	54.8%	
Inflation	21.52%		
Growth: TIU+TOU	15.53%		
Inflation+20% Growth in expenditure	25.30%		
Inflation+50% Growth in expenditure	30.96%		

**Support and service department Salaries are included in Salaries, which constitute Indirect or Overhead costs.*

Source: Statistics South Africa (2016, pp. 23–25, 2020, p. 8).

Table 4.2 illustrates that the Expenses/costs (including compensation of employees, purchases of goods and services and capital expenditure) of managing the 26 South African public universities, on average, grew 38.2% from 2015 to 2019, significantly above the annual South African inflation rate of 21.52% over the same period (Staff writer, 2022c, para. 1). Some would argue that the enrolment growth (calculated as the growth in both TIUs and TOUs) rate of 15.53% should also be considered when interpreting the increase in costs as justification. Still, it is not a reasonable argument from a Management and Cost accounting point of view. As stated before, universities, like other service organisations, have predominantly fixed costs, and an increase in student numbers should lead to only a slight increase in Expenses.

Focusing on the composition of Expenses (costs) at South African universities, the second observation from Table 4.2 is that Salaries comprised 54.8% of the expenditure as explained in 2019, increasing from 54.3% in 2015. For practical purposes, Academic Salaries could be regarded as the only Direct cost of universities to provide higher education to students. Academic Salaries are supposed to be the only cost influenced by the increase in enrolments.

When considering enrolment increases, Table 4.2 illustrates that TIUs and TOUs increased by 15.53% from 2015 to 2019. However, since most of the costs incurred at

South African universities are fixed, an extreme hypothetical scenario can be created where enrolments do not influence the increase in the costs incurred at a university. In this extreme, Table 4.3 illustrates that universities incurred R9.7 billion more than the Budgeted expenditure if growth consists only of inflation. This is, however, an extreme assumption. In a study by Serfontein (2019, p. 122), the cost per module at a South African university was determined by applying a more conservative assumption that 20% of teaching costs vary with a change in enrolments. If we apply the same assumption as the Serfontein study, Table 4.3 shows that universities still spent R7.5 billion more than inflation and 50% of the enrolment growth. Since it is more likely that costs at a university behave in a step-fixed manner, being fixed for a certain number of enrolments and increasing when this range has been passed, an assumption that 50% of the costs vary with a change in enrolments provides a fair picture for universities. When 50% of costs are regarded as varying with a change in enrolments, universities are still liable for overspending R4.2 billion based on the actual expenditure of 2015. Table 4.3 shows what expenditure should've been for 2019 if it grew in line with the stated scenario.

Table 4.3: Budgeted versus actual results for expenditure for 2019

	R million			
	Actual	**Actual**	**Budget**	**Budget - Actual**
Inflation+0% Growth	**2015**	**2019**	**2019**	**2019**
Expenses	57,813	79,920	70,255	- 9,665
Salaries*	31,392	43,763	38,148	- 5,615
Inflation+20% Growth	**2015**	**2019**	**2019**	**2019**
Expenses	57,813	79,920	72,437	- 7,483
Salaries*	31,392	43,763	39,333	- 4,430
Inflation+50% Growth	**2015**	**2019**	**2019**	**2019**
Expenses	57,813	79,920	75,711	- 4,209
Salaries*	31,392	43,763	41,110	- 2,653

**Support and service department Salaries are included in Salaries, which constitute Indirect or Overhead costs.*

Source: Statistics South Africa (2016, pp. 23–25, 2020, p. 8).

When considering Salaries, a conservative, realistic assumption that 50% of expenditure at South African universities will vary with a change in enrolments indicates that universities spent R2.7 billion more on Salaries than they should have spent in 2019. The overspending in Table 4.3 based on what expected spending should've been in an environment with predominantly fixed costs proves that expenditure and specifically Salaries at South African universities are not managed efficiently.

Thus, concluding on Salaries at South African universities, a) it represents 54.8% of Total Expenses, which seems like a high cost, b) Salaries increased substantially more than inflation from 2015 to 2019, and c) the Total Expenses of universities increased more than inflation from 2015 to 2019. Given the fixed nature of the cost in a service environment, there is no logical reason why Expenses at South African universities increased more than inflation.

Overhead costs are primarily indirect and fixed, with no apparent causal, direct or measurable relationship to an organisation's outputs or performance (Dowless, 2007, p. 53; Reider, 2008, p. 4; Dima, 2013, p. 16). The results in Table 4.3 indicate the possibility that Overhead costs increased at an alarming rate at South African universities. The main reason for this increase seems to be in the characteristics of these Expenses. Existing Management and Cost accounting tools are insufficient to address this issue since Management and Cost accounting was initially designed to manage cost with a direct input-output relationship, and minor adjustments were made over the last few decades to manage Overhead costs (Smit and Serfontein, 2019, p. 1340). One example where Management and Cost accounting tools did not develop to manage Indirect costs is Budgeting. Budgeting (directly related to Management and Cost accounting) is also much more effective where the costs are predominantly variable and directly related to the cost objective. In the absence of an input-output relationship, the Budgeting of Overhead costs only focuses on inputs with an insignificant relationship between Revenue and costs.

However, focusing only on inputs without considering the impact on outputs due to the lack of a causal relationship could impact efficiency negatively. Organisational efficiency should continually guide a university towards its goals by frequent measuring to make improvement plans and provide information on organisational performance. Part of the lack of efficiency in universities is the central Budget administration process, anchored in tradition. This Budgeting process sees a programme's current cost allocations based on the previous year's allocation, with only a similar percentage increment for all programmes (Mojahedian *et al.*, 2020, p. 2).

4.5.3. Budgeting

Typical productivity measures require an input-output relationship that does not exist in support and service departments (Charnes *et al.*, 1978, p. 430; Kudla *et al.*, 2016, p. 95). Hence, support and service departments creating Overhead costs are characteristic Cost centres, the Budgeting process is usually discretionary, and an incremental Budgeting approach is often followed (Ortynsky *et al.,* 2021, p. 85).

Globally, it seems as if universities are starting to move away from incremental Budgeting following a natural progress to a hybrid Budgeting model where the strongest aspects of the financial reporting models best serving the needs of the organisation are combined (Berry, 2014, p. 309). One example is the United Kingdom (UK), which follows the transparent approach to costing, combining the benefits of ABC (see section 2.8.2.), time-driven ABC and baseline Budgeting (Berry, 2014, p. 309). In Europe, some universities implemented a hybrid full costing/ABC approach to financial reporting. In the US, even though ZBB is required by law, the complexity and time-consuming process followed for ZBB has proven it impractical, adding little value to financial efficiency overall (Berry, 2014, p. 309).

For higher education institutions, ZBB's value lies in the link between the desired outcomes of the institutions and the Budget justifications (Kirchner and Enyeart, 2009, p. 4). Kirchner and Enyeart (2009, p. 6) also noted that in higher education institutions, ZBB is occasionally applied, especially in departments where funding tends to vary from year to year, or where funding fluctuates between programmes, since it should render sufficient cost savings in the short term to justify the significant initial cost investment due to the high complexity and time required (Coyte *et al.*, 2021, p. 11).

The cost savings resulting from ZBB is due to the opportunity it offers to improve cost management by reducing organisational spending while also improving the organisation's operational efficiency (Hopkins *et al.*, 2015, p. 3; Martin, 2021, p. 43). Across the board, ZBB will not be practical to implement at universities, since around

80% of a university's Budget is allocated to Salaries for continuing faculty, complicating the improvement of spending and, consequently, the efficiency of the organisation (Kirchner and Enyeart, 2009, p. 5).

4.5.4. Defining efficiency and Economies of Scale in a university setting

Efficiency is about the optimal use of scarce resources and maximising the input-output relationship, for a university this typically constitutes teaching Revenue versus teaching costs. This is a fundamental economic and financial management principle to maximise the outputs with the minimum inputs. Understanding how to measure the efficiency of units within a university is one of the main factors to consider in the management of universities (Mojahedian *et al.*, 2020, p. 2). One opinion is that universities' efficiency and financial sustainability depend mainly on their level of competitiveness in the scientific and educational space, their science and development, and how attractive their educational programmes are to investors (Smelov *et al.*, 2018).

To address efficiency at universities, a few issues from the previous section must be highlighted. Firstly, presenting a module, whether existing or new, is a fixed cost, irrespective of the number of enrolments. Secondly, there is a variable cost component that is influenced by the number of enrolments per module. Thirdly, academic staff have limited capacity to present modules; hence, the decision to add modules in a department impacts the staff's capacity. Fourthly, focusing on the financial viability of universities, it is important to understand input-output relationships which form the basis of efficiency in any organisation. It is clear from the behaviour of the biggest portion of the costs incurred by universities that an increase in student numbers as discussed in section 4.2. should not increase the biggest portion of costs and accordingly cause an increase in the fees charged by universities. Universities should have benefited from the increase in student numbers, but this does not seem to be the case. It appears that universities did not benefit from Economies of Scale.

Very little research exists on managing Overheads and management of Overheads to improve efficiency; however, the 1989 source reviewed in this study remains relevant since the issues identified in the study still exists today (Huijben *et al.*, 2014, p. 27). In an environment where costs are predominantly fixed and indirect to the main cost objective, such as Overhead-related cost centres, the Budgeting decision is subjective, with almost no primary focus on efficiency (Smit, 1989, p. 223). This is the classic problem emanating from the inability of conventional Management and Cost accounting tools to increase efficiency in the absence of a clear input-output relationship (Smit, 1989, pp. 233–234). These tools often lead to an increase in support personnel (Overheads) requiring large Budgets, but not contributing directly to outputs (Smit, 1989, p. 233).

This phenomenon of increasing Overhead costs at universities was hinted towards in Table 4.3 in section 4.5.2. The problem highlighted by this increase is that technology should have simplified the workload of Overhead related departments leading to significant savings in personnel costs, but precisely the opposite happened at South African universities. The increase In Salary Costs above inflation highlights the potential mismanagement of fixed, and presumably indirect, costs at South African universities which means that inputs have increased, but not necessarily leading to increased outputs and in effect decreasing efficiency. Almost the only option to increase efficiency, thus limiting the unnecessary escalation of Expenses at universities, is to manage the Personnel Costs of support, service and technical departments. Potential reasons for an escalation of Overhead costs can be the following (Smit, 1989, pp. 223–224).

- Costing systems are much more appropriate where there is a clear input-output relationship;
- Budgeting of cost centres (Overhead costs) manage at best the input costs of discretionary activities and not the relevance or quality of the services rendered;
- Conventional techniques to increase productivity are seldom used on Overhead-related functions, and if it is done, mainly informally and indirectly;
- It is difficult to measure the productivity of Overhead-related functions because it is difficult to set standards for discretionary activities, especially if they are diverse and non-repetitive; and
- The need for more information often creates unimportant and irrelevant information.

The only way to improve efficiency is to improve the input-output relationship, thus rendering the service at a more affordable price. This improved input-output relationship implies saving costs to deliver the service. When considering academic faculties and departments as Profit centres with a clear input-output relationship, conventional cost accounting, Budgeting, and techniques to improve productivity could be used to improve efficiency (Saladrigues and Tena, 2017, p. 118; Sorros, Karagiorgos and Mpelesis, 2017, p. 310).

Some of the typical mistakes made by top management teams of South African universities inhibiting the improvement of efficiency, as concluded from the research by Smit (1989, pp. 208–220) could include the following:

- The creation of a variety and number of jobs in senior management positions rather than an increase in academic staff;
- Too much power in top management's hands often leads to the creation of less important senior posts and too many management levels;
- As organisations grow, a more formal organisational structure is needed, often leading to red-tape and bureaucracy;
- The Hays (or Peromnes) scale used by many large organisations to measure the status and Salaries of management and employees contributes to the problem of Overhead-related departments. The Hays scale focuses on issues such as the number of employees and the size of departments' Budgets to determine the Salaries of departmental managers. In the absence of an input-output relationship, support, service, and technical managers focus on rendering more services to academics to increase their departments' size, thus improving their Salaries; and
- The productivity and control of discretionary Overhead-related functions can only be increased if it complies with the following prerequisites; a) a service can only be judged according to its results or outputs it delivers, b) for every service rendered, there must be someone (preferable line functionaries) benefiting to the advantage of the whole organisation, c) the cost must be about the benefit to the organisation and d) the benefit of the service can best be judged by the person receiving it.

The author of this study believes that bureaucracy and increasing management power in the hands of managers in service, support and technical departments lead to these Overhead-related managers focusing more on creating additional red-tape for academic staff to justify the increase in the size of their departments and less on what they are supposed to do and that is to improve the support and service to line management (academic staff).

The efficient application of university resources with decreasing funding, but increasing enrolments whilst maintaining high-performance levels is a critical topic (Mojahedian *et al.*, 2020, p. 1). Bowen discusses the efficient application of university resources (Bowen, 1977, p. 97). Even though universities are still primarily funded by the government, a limiting Budget means that government is interested in the efficiency of all aspects of higher education, pressuring universities to improve their cost efficiency (Perović and Kosor, 2020, p. 517; Tran, 2020, p. 336). Understanding university efficiency is essential in allocating resources to academic units (Mojahedian *et al.*, 2020, p. 2).

Even though the efficiency of universities is a relevant topic with a lot at stake, it has not received a lot of attention in management science (Fabre, 2013, p. ii). Studies in sociology and management sciences have focused on the central control and presidency, with very little written about implementing the guidelines (including Budgetary controls) as determined by the presidency (typically deans) in the lower tiers of a university (Fabre, 2013, p. ii). Elfin's (1996, p. 90) 1996 summary of the crisis universities faced remains relevant today, over two decades later:

> *"The trouble is that higher education remains a labour-intensive service industry made up of thousands of stubbornly independent and mutually jealous units that must support expensive and vastly underused facilities. It is a more than $200 billion-a-year economic enterprise – many of whose leaders oddly disdain economic enterprise and often regard efficiency, productivity, and commercial opportunity with the same hauteur with which Victorian aristocrats viewed those in "trade"...The net result: a hideously inefficient system that, for all its*

tax advantages and public and private subsidies, still extracts a larger share of family Income than almost anywhere else on the planet."

Some of the responses to a lack of efficiency in private business and routinely in public universities are reducing wasteful costs, increasing Tuition Fees even more, and eliminating specific programmes (Fethke and Policano, 2012, p. 7). Cutting costs, unfortunately, is not a straightforward task for the dean of a faculty and is often complicated on political grounds (Fabre, 2013, p. xii). Therefore, some faculties aim to boost their Revenue instead of cutting costs. This is often done by raising Third-stream Income, such as grants for apprenticeships, in-service training, courses in different countries and collaborating with other institutions. Where these options are not available, faculties aim to increase their allocation from the university's presidency either by negotiating or by looking at the criteria for the allocation, such as increasing student numbers (Fabre, 2013, pp. xii–xiii). This is possible by introducing more courses. Lastly, faculties could ignore cost-cutting and utilise reserve funds (Fabre, 2013, p. xiii). These possible solutions should not be required since the nature of most costs incurred by universities is fixed, means that these organisations should have benefited from Economies of Scale (Moore, 1998, p. 76; Terzioglu and Chan, 2013, p. 33; Serfontein, 2019, p. 9).

4.5.4.1. Economies of Scale

Efficiency in this study is a measurement of how universities benefit from their changing business model and a resulting increase in student numbers, hence benefiting from Economies of Scale by utilising their resources efficiently. In a university environment, Economies of Scale refer to the decrease in the average cost per student as fixed costs are covered by an increasing number of students (Williams, Morgan and Lloyd, 1993, p. 1081; Zhang and Worthington, 2017, p. 1786). Economies of Scale are, therefore, achieved when the cost (resources utilised) of teaching one student presented by an enrolment decreased as the student numbers increased.

Most of the industrial revolutions, including the 4IR, increased the efficiency of industries using technology and Economies of Scale (see section 3.3.). Technology or industrialisation led to an increase in fixed costs (such as machinery) with the intent to lower the variable cost per unit. If we apply these principles to Management and Cost accounting, it is the heart of CVP. The fundamental formula to compute the profits of a cost objective in applying CVP is (Drury, 2018, p. 161):

Equation 4.1: Profit calculation

$$\boldsymbol{Profit = (P - V)\ Q - F}$$

Where:

P = Sales price per unit of output;

V = Variable cost per unit of output;

Q = Number of units of output sold; and

F = Total fixed cost

Using a study by Serfontein and Smit (2021) and assuming a fixed cost (F) per 16-credit module as R160 000 and the variable cost (V) per enrolment as R600, universities have two options to maximise the input-output relationship, and that is to increase the enrolments/volume (Q) per module, or to increase the teaching Income per enrolment (P). Table 4.4 illustrates the results of a department at the related university in the Serfontein and Smit study (2021):

Table 4.4: Statistics of a top-performing department at a South African university

			Percentage		**One U/G**
	U/G	**P/G**	**U/G**	**P/G**	**Module**
Number of weighted modules	28.3	18.8	60.1%	39.9%	1.0
Number of weighted enrolments	10,283	268	97.5%	2.5%	1,540
Weighted enrolment/Weighted module	364	14			1,540
Revenue ('000)	**61,116**	**2,463**	**96.1%**	**3.9%**	**9,017**
Subsidy	24,152	1,357	94.7%	5.3%	3,612
Tuition	36,964	1,106	97.1%	2.9%	5,405
Expenses ('000)	**10,690**	**3,161**	**77.2%**	**22.8%**	**1,084**
Fixed costs	4,520	3,000	60.1%	39.9%	160
Variable costs	6,170	161	97.5%	2.5%	924
Direct contribution	**50,426**	**-698**	**101.4%**	**-1.4%**	**7,933**
Revenue/Weighted enrolment	5,943	9,207		1,528	5,855
Revenue/Weighted module	**2,163,400**	**131,355**		**97**	**9,017,217**
% Subsidy/Revenue	39.5%	55.1%		137.3%	40.1%

The data in Table 4.4 are for 2018, comparing undergraduate (U/G) with postgraduate (P/G) modules. Focusing on the fixed cost data in Table 4.4, which comprise Salary costs of academic staff, almost 40% of capacity are used to present P/G modules and 60% for U/G modules (weighted for 16 credits). However, P/G modules have only 2.5% of the number of enrolments, with an average of 14 enrolments per module, while U/G modules service 97.5% of the enrolments of the department with, on average, 364 enrolments per module. Management would often argue that this might be true, but P/G modules earn more Subsidies, thus having a higher Revenue per module. Although this is correct (see Revenue/Weighted enrolment and % Subsidy/Revenue), the results are concerning. Regardless of the higher Revenue per enrolment for P/G modules, U/G modules generated 96.1% of teaching Revenue, which constitutes a 101.4% of the total contribution of the department.

In contrast, P/G modules do not cover the Direct cost of presenting them. The main driver of financial sustainability is the number of enrolments. Serfontein and Smit (2021, p. 185) found that the number of enrolments directly influences 82.5% of the Direct positive contribution per module, not the funding weights or the NQF levels. The last column in Table 4.4 accentuates the relevance of this discussion. Only one module presented in this department has 476% (1 540 versus 268) more enrolments than all P/G modules combined, generating 266% (R9 017 000 versus R2 463 000) more Revenue and has a Direct contribution of R7.9 million, as opposed to the negative contribution of all P/G modules of R0,7 million.

When considering the findings from Table 4.4, the Revenue per weighted module for U/G, compared to P/G modules and the corresponding direct contributions, illustrates a lack of efficiency in this department. This concept of efficiency (output/input relationship) implies that either the outputs for given inputs are too low, or alternatively, savings are required on the inputs for specific outputs. Suppose Academic Salaries are regarded as fixed costs. In that case, universities will focus only on increasing the outputs without focusing on the inputs, which seems to be the case at most universities. However, this is a fundamentally flawed argument. Preparing and presenting a module has fixed cost implications, irrespective of the number of enrolments. Academic staff have limited capacity to present modules; thus, the assumption that presenting more modules has no cost implications is wrong. Hence, modules cost money, and only enrolments generate Revenue. It is also much more profitable to accept one additional enrolment in an existing module than to present more modules with the intent to increase the number of enrolments.

It was already proven in Table 4.4 that the only driver of optimising the output/input relationship is the number of enrolments (getting beyond the breakeven level of enrolments), not the funding weights or the NQF levels. In Table 4.5, the output/input (OP/IP) relationship of modules is classified into those with an OP/IP ratio of 2.0 and more, those with an OP/IP ratio of between 1.0 and 2.0, and those with a ratio below 1.0 derived from the study by Serfontein and Smit (2021). What is important to note is that this study is based only on 60% of Direct academic costs for teaching. The Indirect costs of operating the university (support and service functions) are more than the Direct costs. Thus, an OP/IP ratio of 2.0 is the minimum to contribute to the covering of Indirect costs of a university.

Table 4.5: Output/Input relationship of modules at a South African university

	Output/Input (Teaching Income/Teaching Costs)			
	Total	**OP/IP > 2,0**	**OP/IP 1,0-2,0**	**OP/IP < 1,0**
Modules	3,690	1,126	640	1,924
Weighted modules	**4,105**	**1,192**	**622**	**2,291**
% Weighted modules	100.0%	29.0%	15.1%	55.8%
Weighted enrolments	**294,045**	**247,780**	**27,042**	**19,223**
% Weighted enrol	100.0%	84.3%	9.2%	6.5%
Teaching Income ('000)	1,778,600	1,484,597	164,120	129,883
% Teaching Income	**100.0%**	**83.5%**	**9.2%**	**7.3%**
Direct teaching cost ('000)	803,793	314,610	112,961	376,221
% Direct teaching cost	**100.0%**	**39.1%**	**14.1%**	**46.8%**
Direct contribution ('000)	**974,807**	**1,169,987**	**51,159**	**- 246,338**
% Direct contribution	100.0%	120.0%	5.2%	-25.3%
Output/Input	2.21	4.72	1.45	0.35

Table 4.5 accentuates that 1 126 of 3 690 modules (29.0%) at the university studied has 84.3% of the enrolments, generate 83.5% of teaching Revenue, only costing 39.1% of Direct teaching Expenses, and contribute 120.0% to cover the Indirect costs of the university. On the other extreme, 2 291 modules (55.8%) serve only 6.5% of the enrolments, generating only 7.3% of teaching Revenue but costing 46.8% of total

teaching Expenses. These modules with an OP/IP ratio below 1.0 are operated at a direct loss of R246.34 million. Thus, the 2 291 modules with an OP/IP ratio of less than 1.0 is a possible explanation for the lack of efficiency experienced at the studied university (Serfontein and Smit, 2021, pp. 182–183).

One of the critical assets universities rely on to fulfil their role is financial resources. It is, therefore, essential that these organisations sustain an overall healthy financial position. Even before the challenges experienced through the outbreak of COVID-19, universities in South Africa experienced various financial struggles, including a decline in funding received from the government (real terms), the aftermath of the #FeesMustFall protests, rising student debts, service insourcing, and a slow economic growth, together with a volatile currency. COVID-19 seems to have aggravated these challenges (Wangenge-Ouma and Kupe, 2020, p. 1). For the management of universities to address these challenges, it is relevant that they understand how management tools (with reference to Management and Cost accounting particularly) can add to the management of costs at their universities. These Management and Cost accounting tools could be very relevant in organisations where the classic resource distribution model, in theory, is based on political control (Fabre, 2013, p. iii). Resource allocation at universities is discussed in more detail in the next section.

4.5.5. Resource allocation in universities

Ongoing protests at universities and the increase of private universities, specifically in South Africa together with the limited government higher education Budgets show that universities are still in a time of rising competition, increasing resistance to price hikes, and declining Budgets. Costing is the primary tool to precede resource allocation (Jenny, 1996, p. 2). From the viewpoint of the university, costs indicate financial performance (Jenny, 1996, p. 2). Even though financial performance is multi-dimensional, the most important aspect is not the model applied to allocate resources, but rather whether resources were allocated efficiently (Jenny, 1996, p. 2). An important metric to consider when the value of educational resources is evaluated is to weigh up the cost against the effect of these resources (Maloney *et al.*, 2012, p. 223).

For the universities studied by Fabre (2013), resources were most often allocated on a San Remo basis (a set amount per student multiplied by the number of students). This control mechanism aims to relate the organisation's output to resource allocation. Even though a global endowment replaced the San Remo basis for university resource allocation, it is still often used as an internal allocation base, since it is a familiar allocation base that seems fair and transparent (Fabre, 2013, p. iv).

However, universities fall into professional bureaucracies (specifically, their teaching activities). A professional bureaucracy relies on the standardisation of skills (Mintzberg, 1979, p. 348). According to Mintzberg (1979, pp. 365–366), in professional bureaucracies, resources are allocated based on the organisation’s internal power balances. These internal power balances are related to the disciplines’ prestige or political backing. Organisations categorised as professional bureaucracies sometimes find it difficult to function outside the market sector, and universities are no exception (Fabre, 2013, p. v). Mintzberg (1979, p. 381) further states that multi-disciplinary universities also illustrate some features of a divisionalised structure. This structure is often the outcome of a group of independent organisations that operate in different markets being centralised, but transferring some of their power to “*the strategic summit*” (Fabre, 2013, p. 5).

In a divisionalised structure, the establishment keeps the central power, which constitutes allocating resources to the different units, but usually with performance control not functioning as it should. The main reason for this malfunction is the complex tasks performed, which means that multi-criteria should be implemented for performance evaluation (Fabre, 2013, p. v). Another reason why performance control might malfunction in a divisionalised structure is that divisions (faculties) within a university are not systems integrated with a chain of command that works together to implement common objectives, but a collection of individuals with various objectives (Fabre, 2013, p. v). From the background of faculties as divisions of a university, to understand better how resource allocation in universities works, the role of the dean of a faculty is a crucial starting point. The dean, elected by his peers and not the presidency, must answer to the presidency for his faculty’s Budget and defend the interests of the related faculty (Fabre, 2013, p. vi).

The dean has certain biases, such as his laboratory, department, and the courses he taught, causing doubt about how impartial he is, specifically when it comes to internal resource distribution. However, the dean's authority remains limited, especially regarding faculty careers and even the closure of courses, since academia favours consensus over hierarchy (Fabre, 2013, p. vi). Adding political power to the required consensus questions the value of Management and Cost accounting tools (i.e. ratios or standards) to control costs (Fabre, 2013, p. vii).

It appears as if universities are not attempting to analyse the needs of their faculties to determine the resources required and whether their consumption is within the norm. The San Remo standards mentioned above correspond with the average cost scenario, which is not necessarily representative of the resources required for the optimal functioning of faculties. These standards do not, for example, include the hours required to monitor collective dissertations and student placements and, since these norms are considered too low, the financing of the courses are far outstripped by their costs (Fabre, 2013, p. iv). An added strain on effective cost control at universities is that the constraint on financing is a concept that does not form part of any specified control of the university when setting the course curriculum and is accordingly not clearly understood by faculty. This lack of understanding often leads to top management at universities having little (or no) control over the offering of courses failing therefore to effectively control costs (Fabre, 2013, p. iv). Even the process of reaccreditation has seen many creations of courses, but not necessarily discontinuation of courses, even if there is a malfunction such as low student numbers (Fabre, 2013, pp. iv–v). An increased number of courses offered will increase the costs incurred by the university. Still, it won't necessarily lead to a corresponding increase in Revenue (most often associated with increased enrolments) (Fabre, 2013, p. v).

However, what is clear is that universities aim to optimise the use of resources as much as possible by using stringent allocation policies. These strict measures mean that a reserve of resources can be built to be utilised for other activities. The reserve of resources is often a motivator for deans to cut costs, an exercise that requires suitable Management and Cost accounting tools (Fabre, 2013, p. xiv). To apply Management and Cost accounting tools effectively, in-depth knowledge of the drivers of costs and Income at universities is critical.

4.5.5.1. Cost and Income drivers at universities

When the management of university modules is considered, two fundamental principles in economics should be considered, namely the OP/IP relationship and Economies of Scale. The OP/IP relationship focuses on the optimal use of inputs to generate outputs. Economies of Scale refer to the issue of, specifically in an environment of high fixed costs, the higher the outputs, the higher the potential profits (refer to section 4.5.4.1.). Organisations using more technology increase their fixed costs to lower their variable costs. The only justification for this decision is that they will reduce their unit costs if their sales units increase. This can be illustrated by the following example of two hypothetical organisations, one operating mainly through automation, the other functioning by manual operation:

Table 4.6: Costing implications of manual versus automated systems

	Manual	Automated
Fixed costs	R1,000,000	R4,000,000
Sales price per unit	R100	R100
Variable costs	R75	R25
Units sold	50,000	50,000
Profit	R250,000	-R250,000
Total cost per unit	R95	R105
Units sold	80,000	80,000
Profit	R1,000,000	R2,000,000
Total cost per unit	R87.50	R75.00

The main objective of the illustration in Table 4.6 is to show that with low fixed costs and high variable costs, organisations making use of primarily manual operating systems earn a profit of R250 000 at a sales level of 50 000 units, increasing to a profit of R1 000 000 if sales increase to 80 000 units. For manual operating systems, the cost per unit (including fixed and variable costs) declines from R95 to R87.50 per unit when sales units increase from 50 000 to 80 000 units. In contrast, highly automated organisations (utilising technology) lose R250 000 at a sales level of 50 000 units, which increases to R2 000 000 selling 80 000 units. In this scenario, the cost per unit (including both fixed and variable costs) decline from R105 (50 000 units) to R75

(80 000 units) per unit. The example used in Table 4.6 illustrates that in an environment of high fixed cost per period and low variable cost per product/service, the main driver of financial sustainability lies in the number of products/services sold. This typically describes the university environment with a high fixed cost structure and relatively low variable costs.

In a 2014 study focusing on private Japanese universities, universities with smaller numbers of enrolments were financially worse off than their bigger peers (Nemoto and Furumatsu, 2014, p. 215). For the same group of universities, if the institution had less than 3 000 students, they did not even break even, whilst student numbers exceeding 8 000 provided an average net profit ratio of 7% (Nemoto and Furumatsu, 2014, p. 216). This implies that the main driver of profitability per module or degree at universities is the number of enrolments. This finding agrees with the Serfontein and Smit (2021) study mentioned earlier, indicating a very strong, positive correlation between the number of students enrolled in a module and the direct profit of that module (85.2% of profits explained by the number of enrolments with sig. = .000).

In section 4.5.4.1, Equation 4.1 illustrates how the profit for an organisation is calculated. The profit equation implies that one must also compute the breakeven point, since an organisation will only incur a profit after the breakeven (BE) sales volume is achieved. From the perspective of a university, BE refers to the estimation of the minimum number of enrolments in a particular course (typically a module) to ensure that the course does not incur a loss (Maloney *et al.*, 2012, p. 227). BE is calculated as follows (Drury, 2018, p. 172):

Equation 4.2: Breakeven calculation

$$Q = F / (P - V)$$

In Equation 4.2:

Q = Breakeven number of units sold;

F = Total fixed costs;

P = Sales price per unit of output; and

V = Variable cost per unit of output;

When considering the OP/IP relationship, another problem regarding universities was observed. The Salaries of academic staff (identified as the Direct costs of universities) are predominantly fixed. It is, therefore, easy for university management to assume that presenting another module implies no additional costs. However, this is a wrong assumption. For simplicity purposes, the building blocks of teaching Income start with modules (courses) to obtain a qualification. Teaching Income typically comprises more than 70% of the unrestricted Income of most universities (Serfontein, 2019, p. 122). From a costing point of view, the researcher has identified five essential factors that impact the cost of presenting a module. Firstly, there is a set-up or fixed cost to present a module referring to the planning of the content, putting a study guide together and setting up tests, assignments and examination paper(s) and lecturing, irrespective of the number of students enrolled. Secondly, academics have limited capacity to prepare and present modules. Thirdly, there is also a variable cost associated with student enrolments per module. This typically involves marking assignments, tests and exam papers, consultation hours per student, and even repeating the module's presentation if there are too many enrolments. Fourthly, it is expected from academics to do research, and their research outputs are often the only criteria determining their promotion. Lastly, the number of credits (the number of periods. i.e. block of time allocated for lectures) presented per week and the duration of the module (for example, semester versus annual) influence the set-up/fixed cost per module and variable costs per enrolment.

Typically, a lecturer has limited capacity to present more modules. As illustrated in Table 4.7, Serfontein and Smit (2021) established that at a selected South African university, the fixed cost per module (16 credits) was R136 981 with a Variable Cost of R478 per additional student enrolment. However, these figures were based on averages for all weighted modules (converted to 16 credits) at a specific university, not taking different departments or education levels (undergraduate versus postgraduate modules) into account, the researchers believed that it is a fair assumption with relatively minor deviations amongst various faculties, departments, and modules.

Table 4.7: Calculation of breakeven enrolments per module at various NQF Levels

NQF Level	Fixed cost/ Weighted Module	Income/Weighted Enrolment	Variable cost/Weighted Enrolment	Breakeven
NQF5-7	136 981	5 658	478	26,4
NQF8	136 981	8 437	478	17,2
NQF9	136 981	10 741	478	13,3
Total	**136 981**	**6 049**	**478**	**24,6**

From Table 4.7, presenting an existing module to one additional student/enrolment results in an additional cost of R478, while presenting a new module to one student implies a cost of R137 459 (R136 981 + R478), which is a substantial difference. Thus, from an OP/IP perspective, presenting an additional module has cost implications, and it is predominantly a fixed cost.

The decision to present an additional module typically rests with the related faculty or department, but it is also influenced by guidelines from top management, which causes additional problems. Presenting a module is a discretionary decision impacting the academic capacity within a department. The reasoning that Academic Salaries are fixed; hence, presenting another module has no impact on the fixed cost of the department is a misconception. What makes Academic Salaries different from conventional fixed costs is that these costs are fixed because universities normally employ academic staff full-time. Still, the staff have limited capacity in terms of how many modules they can present and the number of enrolments per module they can manage. This is a considerable limitation in terms of Management and Cost accounting principles, where it is regarded that a fixed cost is not impacted by output in a short time (see section 2.3.2.5.). However, presenting an additional module creates an additional effort from a specific lecturer, affecting their capacity to present the additional module. Therefore, it could be concluded that presenting an additional module potentially has a cost implication, while only the number of enrolments creates an Income, creating a potential problem with improving the efficiency of a university since presenting more modules does not automatically result in increased profits, rather potentially the opposite.

A further problem associated with universities is the implication of the department, identified through Classification of Educational Subject Matter (CESM) categories presenting the module as well as the academic level of the module (NQF or Course level). In South Africa, government subsidies differ per 16-credit module, depending on the department or CESM category, with factors of 1; 1.5; 2.5 and 3.5. This implies that certain departments will receive a subsidy of 3.5 times as much as other departments per enrolment. In addition to the CESM category, the NQF level also determines government subsidies, ranging from 1 to 4. This implies that a 16-credit, postgraduate master's module will receive three times the subsidy of an undergraduate module in the same department (DHET, 2017, p. 7). The logical conclusions from these funding factors are, *ceteris paribus*, that universities should focus on those departments with the highest CESM category and the highest NQF level (master's module versus U/G module). However, this argument has a fatal flaw, and the problem is also illustrated in Table 4.7. From Table 4.7 is deducted how the Income per weighted module (16 credits) differ, on average, from R5 658 to R10 741 per enrolment, depending on the various NQF levels. Another flawed assumption is that universities should focus on the high CESM category and NQF 8+ (honours and higher) level modules. Actual results from Serfontein and Smit's (2021) data present the following information (Tables 4.8 to 4.11).

Table 4.8: Undergraduate modules at a South African university

Undergraduate modules	NQF 5-7	
	Number	**% Total**
Number of modules	2,419	65.60%
Number of weighted modules	2,191	53.40%
Number of enrolments	260,502	90.80%
Weighted enrolments	256,440	87.20%
Subsidy Income	R625,318,367	76.10%
Tuition Income	R825,636,255	86.30%
Teaching Income	R1,450,954,622	81.60%
Direct cost	R423,926,872	60.30%
Direct contribution	**R1,027,027,750**	**95.50%**
Net profit	R505,139,404	148.50%
Weighted enrolment/Weighted module	117	
Cost per weighted module	R193,530	
Teaching Income per weighted module	R662,385	

Table 4.8 focuses only on undergraduate modules (NQF 5-7). Interestingly, only 53.4% of all the weighted teaching modules are U/G, but they service 87.2% of all the weighted enrolments. Universities would often argue that U/G enrolments are less critical because the levels of government subsidies are much higher for P/G modules. However, these U/G modules generated 81.6% of the teaching Income. After taking the Direct cost of presenting these modules into account, it contributed 95.5% to the Direct contribution available to cover the Indirect/Overhead costs of the university. Another observation is that there are, on average, 117 weighted enrolments per U/G module. To take it to the next level, it is essential to differentiate between U/G modules covering their Direct costs of presenting them versus those that do not (see Table 4.9).

Table 4.9: Direct contribution of undergraduate modules at a South African university

	Undergraduate (U/G)		
Positive direct contribution:	**Number/Amount**	**% of U/G**	**% of Total**
Weighted modules	1,391	63.5%	33.9%
Weighted enrolments	246,062	96.0%	83.7%
Teaching Income	R1,403,558,092.50	96.7%	78.9%
Direct cost	R306,774,273.83	72.4%	43.6%
Direct contribution	R1,096,783,818.67	106.8%	102.0%
Weighted enrolment/Weighted module	176.9		
Negative direct contribution:	**Number/Amount**	**% of U/G**	**% of Total**
Weighted modules	799	36.5%	19.5%
Weighted enrolments	10,378	4.0%	3.5%
Teaching Income	R47,396,529.00	3.3%	2.7%
Direct cost	R117,152,597.94	27.6%	16.7%
Direct contribution	-R69,756,068.94	-6.8%	-6.5%
Weighted enrolment/Weighted module	13.0		

Focusing on the weighted U/G modules with a positive Direct contribution in Table 4.9, only 33.9% of all teaching modules represent U/G modules and service 83.7% of all weighted enrolments. U/G modules with negative Direct contributions (799 weighted (16-credit) modules) have 10 378 enrolments (3.5% of the total). Referring to Table 4.7, the breakeven level for undergraduate modules of 26.4 per module is not achieved in 36.5% of the U/G modules or 19.5% of all modules at the relevant university. This confirms that the number of enrolments is the primary driver of financial sustainability at universities. It also highlights the problem of cross-subsidising (Serfontein & Smit, 2021).

Table 4.10: Postgraduate modules at a South African university

Postgraduate modules	NQF 8-9	
	Number	% Total
Number of modules	1,271	34.44%
Number of weighted modules	1,914	46.64%
Number of enrolments	26,330	9.18%
Weighted enrolments	37,605	12.79%
Subsidy Income	R196,030,733	23.87%
Tuition Income	R131,614,345	13.75%
Teaching Income	R327,645,078	18.42%
Direct cost	R278,935,854	39.69%
Direct contribution	**R48,709,224**	**4.53%**
Net profit	-R165,011,767	-48.51%
Weighted enrolment/Weighted module	20	
Cost per weighted module	R145,706	
Teaching Income per weighted module	R171,150	

Table 4.10 focuses on the P/G modules at the South African university selected in the study by Serfontein and Smit (2021). Table 4.10 indicates that the university presents 34.4% of all the modules at NQF 8 and 9 levels, servicing only 12.8% of the total weighted enrolments. Although the Subsidy Income is, as opposed to U/G modules, higher than Tuition Income, the Direct contribution is only R48.7 million or 4.5% of the total direct contribution of the university. Using 34.4% of the teaching capacity to generate only 4.5% of direct contribution indicates a flawed strategy from a financial sustainability point of view. The relatively small number of enrolments of the NQF8-9 modules at the related university, on average 20, is the main contributing factor to the relatively weak performance of postgraduate modules.

In Table 4.11, a split between those P/G modules covering their Direct costs versus those that do not at the university forming part of the Serfontein and Smit (2021) study are presented. Table 4.11 highlights that only 36.3% (461) of the weighted P/G modules have 82.8% of the weighted P/G enrolments, while the other 63.7% are presented to only 17.2% of the P/G enrolments; thus, most of the P/G modules do not cover the Direct cost of presenting them. In terms of Direct contribution, the related university's 461 weighted P/G modules with a positive contribution have, on average, 51.4 weighted enrolments, while the 810 weighted P/G modules with a negative contribution have only 4.9 weighted enrolments on average. This confirms that the primary issue influencing the potential financial viability of universities is the number of enrolments.

Table 4.11: Direct contribution of postgraduate modules at a South African university

	Postgraduate (P/G)		
Positive direct contribution:	**Number/Amount**	**% of P/G**	**% of Total**
Weighted modules	461	36.3%	12.5%
Weighted enrolments	31,151	82.8%	10.6%
Teaching Income	R264,041,931.00	80.6%	14.8%
Direct cost	R97,951,168.55	35.1%	13.9%
Direct contribution	R166,090,762.45	341.0%	15.4%
Weighted enrolment/Weighted module	51.4		
Negative direct contribution:	**No./Amount**	**% of P/G**	**% of Total**
Weighted modules	810	63.7%	22.0%
Weighted enrolments	6,455	17.2%	2.2%
Teaching Income	R63,603,146.50	19.4%	3.6%
Direct cost	R180,984,684.98	64.9%	25.7%
Direct contribution	-R117,381,538.48	-241.0%	-10.9%
Weighted enrolment/Weighted module	4.9		

Table 4.11 is, however, not the complete picture. Many of the NQF 8 and 9 modules of the university presented in Table 4.11 are not truly P/G modules, depending on the course levels assigned to the modules; hence they could be the fourth year of a four-year undergraduate degree. If these modules are excluded, the actual postgraduate modules with a positive contribution only have a direct Income of R24.4 million instead of R166.1 million, which is a significant difference. Consequently, the researcher acknowledges the following findings surrounding universities:

- They are not-for-profit organisations;

- The data used in the Serfontein and Smit (2021) study are from one university only;
- The drive for research is a primary strategic objective for universities, and P/G teaching modules are the feeding source for research master's and PhDs.

From a financial point of view, the financial sustainability of universities is under threat, as indicated by the various complexities described in this section from a Management and Cost accounting point of view. The final threat to universities is related to the disruptions described in Chapter 1 and 3 that traditional universities must rethink 'How' they teach. How universities teach refers to the traditional university business model of on-campus, face-to-face tuition. COVID-19 and the resulting expediting of the 4IR, open-source education, MOOCs and online universities are some of the factors impacting the traditional competitive advantage of universities related to geographical location and face-to-face tuition.

4.6. Changing 'How' universities teach

Higher education is changing, since the current business model (primarily face-to-face teaching) no longer meets the needs of stakeholders. A new business model for universities is required, since traditional universities have a responsibility to make higher education more accessible whilst remaining financially sustainable (Saayman, 2020, pp. 4–5). South Africa has seen a rise in demand for affordable, online education, especially among poor households unable to afford a face-to-face university education. This increased demand for online education seems to be a global trend (Saayman, 2020, p. 10).

Traditional universities face a disruptive environment, potentially losing many enrolments to open-source, online learning. This free or less expensive online learning will probably focus on those qualifications and modules with a high demand to benefit from Economies of Scale, impacting the current money-spinners with an OP/IP ratio of 2.0 and higher (refer to Table 4.5). Only a few years ago, the establishment of MOOCs providing education at a time and place that suits the student threatened to change the university landscape (Editorial, 2014, p. 1; Peters, 2020, p. 2). Universities are under threat by, amongst others, Coursera and edX, both providing MOOCs (De

Jong and Van Dijk, 2015, p. 1). MOOCs provide education at a marginal cost of almost zero (De Jong and Van Dijk, 2015, p. 10).

> *"If South African universities do not adapt and do so quickly, they run the risk of losing relevance in the broader higher education environment due to the competition from especially international universities which have a strong presence in the online environment"* (Coetzee et al., 2021, p. 10).

The response of universities to the disruption is yet to be seen. Presenting more modules with low enrolment levels will only spiral their problem out of control. University decision-makers have a daunting task ahead.

4.7. Summary

One of the main characteristics of the disruption universities face is uncertainty. The management of this uncertainty cannot be reduced to risk management and universities must act proactively and innovatively to address the disruption. Universities must strengthen their ability to deal with unknown factors, identify emerging developments, and ultimately create new paths to the developing future (Wangenge-Ouma and Kupe, 2020, pp. 1–2). Universities engage in many diverse academic activities, including teaching (general and contract), research (including contract research), technology transfers, academic conferences, and consulting services (Oduoza, 2009, p. 134). Suppose a university does not have an effective costing system in place. It is impossible to evaluate the Total Revenue and costs incurred by these diverse services offered systematically. Therefore, data on costs and Revenue will not be available to "*inform future strategies and value for money assessments*" (Oduoza, 2009, p. 134).

Management and Cost accounting is the main system to provide decision-makers at universities with relevant and accurate data to address the uncertainty faced by the organisations. However, the application of Management and Cost accounting is complicated by the intangible nature of the cost objective delivered by a university, a typical service organisation. Further complications include the diversity of services offered, the Joint cost nature of universities, and the fact that most costs at these organisations are fixed and consist of primarily Academic and Other Salaries.

Although the Salaries of academic staff represent a fixed cost to universities, the capacity of staff to present more modules is limited. Thus, the misperception that the cost of academic staff is fixed, irrespective of the number of modules offered or even the number of enrolments, seems to influence top management decision-making that the only solution to improve the financial sustainability of a university is to increase enrolments by presenting more modules and degrees. This argument, however, is flawed, and precisely the opposite is true. From Table 4.5 (see section 4.5.4.1.), removing all the modules with an OP/IP ratio of below 1.0 (and even 2.0) would save the university potentially 45.5% of the Direct teaching Expenses, impacting only 6.6% of enrolments of the related university.

Increasing enrolments and focusing on limiting input costs will increase efficiency at universities. However, the trend observed in South African universities is an increase in Income supported by increases in costs. Growth in Income has resulted from Tuition Fees increasing above inflation over the past decade, since the Government Subsidy portion of Income decreased notably. All indications are that Tuition Fees were increased in response to the lack of cost management at South African universities, with Overhead costs being the primary concern.

In addition to the excessive increase in Tuition Fees and the lack of management of costs, universities are failing to meet the expectations of students. In South Africa, students require relevant, affordable education to ensure employability. This entails that universities must seriously consider the programmes they offer to students and their responsibility to manage costs more effectively to enable reasonable Tuition Fees.

The next chapter will provide a detailed explanation of the methodology followed in this study to provide relevant, accurate information to the decision-makers at South African universities to address the issues and concerns discussed in this chapter.

Chapter 5 – Research methodology, research design and research method

5.1. Introduction

Research is a "*systematic process of collecting, analysing and interpreting information – data – to increase our understanding of a phenomenon about which we are interested or concerned*" (Ormrod and Leedy, 2021, p. 24). Goodchild (2016, p. 29) added to this definition of research by stating that research is an original investigation with the primary aim of discovering and interpreting facts or revising accepted laws and theories, taking new facts that emerged into account, or practically applying new or revised laws and theories through the knowledge gained in the process. The dictionary definition of research provides a clear explanation of what research entails. According to Lexico.com (n.d., para. 1), research is "*The systematic investigation into and study of materials and sources to establish facts and reach new conclusions*."

Based on the definitions of research provided, research follows two distinct processes. The first process is an investigation, followed by applying the existing theories to new facts discovered (Crous, 2012, p. 26; Goodchild, 2016, p. 30). Both processes are critical for the researcher to reach new conclusions. For this study, the researcher performed a literature review, followed by an empirical study.

The broad approach a researcher follows in conducting research entails the intersection of philosophy, research designs and specified methodology (Creswell and Creswell, 2018, p. 43). This chapter discusses the research approach of this study, focusing on the research method followed in the empirical part of this study. This discussion involves a description of the philosophical framework of the research. It then evolves into an in-depth discussion of the research design. The next section of this chapter is a detailed description of the methodology followed during the empirical testing performed in this study. The description of these methods includes the detail of the sample selected. A discussion of the research methods followed in a study is critical since the assumptions underlying a research project sometimes appear self-explanatory, often causing the researcher not to mention them (Ormrod and Leedy, 2021, p. 30). The discussion in this chapter focuses on the research population referring to 26 publicly funded universities in South Africa. To improve the efficiency of the discussion in this chapter, the term ‘universities’ encompass the 26 publicly funded universities in South Africa.

5.2. Philosophical assumptions underlying the research methodology adopted

Philosophical assumptions are necessary to point researchers in specific directions on their path to making sense of the world around them (Ormrod and Leedy, 2021, p. 30). This section investigates positivism, postpositivism, constructivism and phenomenology as philosophical orientations the researcher considered.

From a historical perspective, a big portion of the research, specifically in natural sciences, has followed a positivist philosophy (Ormrod and Leedy, 2021, p. 30). Positivism is a perspective that, with appropriate measurement tools, absolute, undeniable truths about cause-and-effect relationships can be determined within human experience and the physical world (Ormrod and Leedy, 2021, p. 30).

In contrast to positivism, social sciences often view the world as a slightly less objective space filled with absolute truths. Social scientists prefer a postpositivist philosophical perspective. Postpositivism is a belief that true objectivity in the quest for absolute truths is elusive (Ormrod and Leedy, 2021, p. 30). Therefore, researchers will inevitably include certain biases in their investigations, even though they strive for objectivity in collecting and interpreting data (Ormrod and Leedy, 2021, p. 30).

Researchers with a constructivist perspective have abandoned the notion that absolute truths exist, just waiting to be discovered (Ormrod and Leedy, 2021, p. 31). The realities constructivists discover, in their view, are only human creations that can aid in the process of finding subjective meanings using the data collected (Creswell and Creswell, 2018, p. 46; Ormrod and Leedy, 2021, p. 31). Constructivists tend to be quite open about the biases they possibly bring to their research endeavours (Creswell and Creswell, 2018, p. 46; Ormrod and Leedy, 2021, p. 31).

Where constructivists tend to focus their research on their research subjects’ perceptions and interpretations of a variety of occurrences, phenomenologists’ focus is on the experience of human beings in their world (Edmonds and Kennedy, 2017, p. 168; Ormrod and Leedy, 2021, p. 31). Phenomenologists ask questions starting with the phrase *"What is it like to be …"* (Ormrod and Leedy, 2021, p. 31).

Quantitative research may be performed from a postpositivist perspective with probabilistic tendencies (Creswell and Creswell, 2018, p. 45; Ormrod and Leedy, 2021, p. 31). Researchers in quantitative research advance the relationship among variables. These advanced relationships are then posed as questions or hypotheses (Creswell and Creswell, 2018, p. 45). This is true, especially for statistical analysis (Creswell and Creswell, 2018, p. 45; Ormrod and Leedy, 2021, p. 31). Statistical analysis is typically applied to explain the situation of concern or to describe the causality of the variables considered (Creswell and Creswell, 2018, p. 45). Contrary to quantitative research, qualitative research can take on a constructivist or phenomenology mindset, ascertaining certain beliefs, experiences, and perceptions of people instead of pinning down absolute truths that might not be real (Creswell and Creswell, 2018, p. 45; Ormrod and Leedy, 2021, p. 31).

Section 1.5 of this study established that this is an exploratory, quantitative study. The quantitative analyses performed in this study identify certain cause-and-effect relationships. These relationships apply to all universities because of the sample selected, as explained in section 5.6.3. This study, therefore, is based on a positivist perspective, focusing on the cost efficiency at South African universities. This chapter describes the quantitative data analysis techniques applied in this study. After the quantitative data analysis techniques are discussed, a detailed description is provided of the methodology followed in analysing the Financial Statement data to determine the cost efficiency at South African universities.

5.3. Research design

The research design is the overall strategy to address the research problem or research question (Neneh, 2013, p. 95; Ormrod and Leedy, 2021, p. 106). The choice of research design is based on the nature of the research, the research setting, possible limitations on completing the research, and the underlying paradigm notifying the research project (Neneh, 2013, p. 95). Two types of research designs are discussed in this section, qualitative and quantitative research. To all outward appearances, both qualitative and quantitative research follow similar processes. Both designs require the identification of a research problem or a research question; both entail the review of applicable literature and the collection and analysis of data. However, different data problems and questions will require different designs (Ormrod and Leedy, 2021, p. 112).

5.3.1. Qualitative research

Qualitative research is focused on obtaining an in-depth understanding of the theory surrounding a topic and interpreting results in a non-numerical manner (Crous, 2017, p. 22). According to Ormrod and Leedy (2021, p. 112), qualitative studies use primarily non-numerical data. In qualitative studies, words are emphasised over the quantitative analysis of data collected (Bryman *et al.*, 2014, p. 31; Goodchild, 2016, p. 35). Qualitative research further emphasises generating rather than proving theories (Bryman *et al.*, 2014, p. 31). Furthermore, qualitative research obtains detailed knowledge of a specified field, enabling the researcher to understand the context applicable to the activities undertaken and the decisions made (Neneh, 2013, p. 96; Goodchild, 2016, p. 36).

5.3.2. Quantitative research

Quantitative research collects numerical data and applies statistical analyses to the gathered data (Bryman *et al.*, 2014, p. 41; Goodchild, 2016, p. 35). Quantitative research emphasises figures and numbers during data collection and analysis (Saayman, 2020, p. 94). One notable benefit of quantitative studies is that statistical analyses used to describe data reduce the amount of time and effort of the researcher in the description of their results (Saayman, 2020, p. 94).

Table 5.1, adapted from Neneh (2013, p. 97), compares qualitative and quantitative research. Table 5.1 also describes the scientific method each type of research study could encompass.

Table 5.1: Characteristics of qualitative and quantitative research

Criteria	Quantitative research	Qualitative research
Purpose	• To test hypotheses, look at cause & effect, and make predictions; • To test theory; • To measure objective facts.	• To understand and interpret social interactions; • To build theory; • Construct social reality.
Variables	• Specific variables studied.	• Study of the whole, not variables.
Nature	• Focused; • Known variable; • Established guidelines; • Static design; • Context-free.	• Holistic; • Unknown variable; • Flexible guidelines; • Emergent design; • Context bound.
Type of data	• Collected numbers and statistics.	• Words, images, or objects.
Forms of data collection	• Close questions, and precise measurements using structured & validated data-collection instruments.	• Open-ended responses, interviews, participant observations, field notes, & reflections.
Objectivity and Subjectivity	• Objectivity is critical.	• Subjectivity is expected.
Type of data analysis	• Identify statistical relationships; • Descriptive and inferential statistics. • Content analysis,	• Identify patterns, features, and themes; • Content analysis.
Results	• Generalisable findings that can be applied to other populations.	• Particular or specialised findings that are less generalisable.
Scientific method	• Confirmatory or top-down: the researcher tests the hypothesis and theory with the data.	• Exploratory or bottom-up: the researcher generates a new hypothesis and theory from the data collected.
Final report	• Statistical report with correlations, comparisons of means, & statistical significance of findings.	• Narrative report with contextual description & direct quotations from research participants.

Source: Neneh (2013, p. 97).

From the characteristics of qualitative and quantitative research designs identified in Table 5.1, this study will follow a quantitative research design. The primary motivation for following a quantitative research design is the type of data collected.

The empirical part of this study analyses numerical data from the Financial Statements of selected universities. The Financial Statements of the sampled universities were collected for 2010, 2015 and 2019. All data collected during the empirical part of this study were numerical. The analyses were performed over a nine-year period from 2010 to 2019. Part of the analyses was determining cause-and-effect relationships between the different data elements. The data were then also statistically analysed.

5.4. Research purpose

5.4.1. Exploratory research

Exploration is a phase in every research project. However, exploratory research is a crucial tool in a field of study with a limited, ambiguous, or uncertain existing body of knowledge (Van Zyl *et al.*, 2017, p. 87). Under conditions of uncertainty, ambiguity, or limitations, exploratory research assists the researcher in developing "*theoretical frameworks, hypotheses or research propositions*". The researcher can then apply different research designs to test these propositions, frameworks, or hypotheses (Van Zyl *et al.*, 2017, p. 87). According to Cooper and Schindler (2011, p. 143), exploratory research assists researchers to *"develop concepts more clearly, establish priorities, develop operational definitions, and improve the final research design*".

5.4.2. Explanatory research

Explanatory research mainly aims to establish a causal relationship between variables, leading to the alternative term of causal research (Cooper and Schindler, 2011; Malhotra, Nuna and Birks, 2017, p. 79; Van Zyl *et al.*, 2017, p. 90). Explanatory research is often referred to as experimental research. Explanatory research can, therefore, be true experimental or quasi-experimental (Malhotra *et al.*, 2017, p. 315; Van Zyl *et al.*, 2017, p. 90). Pre-experimental research, however, forms part of exploratory research, as investigated in the previous section (Malhotra *et al.*, 2017, p. 315; Van Zyl *et al.*, 2017, p. 90).

Accurate experimental research is achieved upon meeting four conditions: a control group is used to enable comparison with the treatment group; random allocation of research subjects between the control and treatment groups; establishing a baseline measurement with the aid of pre-testing and the researcher's control of possibly confounding variables (Malhotra *et al.*, 2017, p. 317; Van Zyl *et al.*, 2017, p. 91). A confounding variable is a variable with a different effect than expected (Cooper and Schindler, 2011, p. 716; Malhotra *et al.*, 2017, p. 910). During true experimental research, the treatment group is the group receiving the intervention, programme, or treatments. The treatment group's results are measured against the control group (Malhotra *et al.*, 2017, p. 317; Van Zyl *et al.*, 2017, p. 91). True experimental research is challenging to apply to economic and management sciences. Economic and management sciences is a field exposed to various factors entirely out of the researcher's control, making it nearly impossible to control confounding variables (Van Zyl *et al.*, 2017, p. 91).

When considering economic and management sciences, quasi-experimental research is more practical. When quasi-experimental research is applied, random allocation of research subjects between the treatment and control groups is not required, and the researcher is not expected to control all confounding variables (Malhotra *et al.*, 2017, p. 318; Van Zyl *et al.*, 2017, p. 92).

Although causal or experimental research is considered part of quantitative research designs, quantitative research can be non-experimental. An example of non-experimental quantitative research is *ex post facto* studies where groups are also compared, but without any manipulation by the researcher of the independent variable. The main reason why the researcher cannot manipulate the independent variable is that groups are randomly allocated (Van Zyl *et al.*, 2017, p. 93).

Another form of non-experimental quantitative research is causal or correlation research. Correlation research measures the linear relationship between variables without establishing causality. Correlation research is a method that is often used in economic and management sciences (Van Zyl *et al.*, 2017, p. 93). The next section considers descriptive research as the third research purpose investigated in this study.

5.4.3. Descriptive research

With descriptive research, a researcher aims to describe a particular event. Descriptive research applies quantitative survey methodology and is quantitative in nature. This form of research is performed by researchers applying observation studies, descriptive surveys, or developmental design (Malhotra *et al.*, 2017, p. 73; Van Zyl *et al.*, 2017, p. 89). Each of these forms of descriptive research studies is briefly discussed in this section.

The purpose of observation studies is a focused and structured attempt to form an objective conclusion based on observing the subject/target researched in their natural setting. Observation requires of the researcher to observe a selected phenomenon within a specific time frame while meticulously recording the observation results. The results recorded should enable the quantification of data that can be generalised to the population. Observation studies are helpful in research performed in economic and management sciences (Malhotra *et al.*, 2017, p. 289; Van Zyl *et al.*, 2017, p. 89).

When considering developmental research designs, a researcher's main aim is to determine how the behaviour and characteristics of people change over time. This form of research can be either longitudinal or cross-sectional (Malhotra *et al.*, 2017, p. 74; Van Zyl *et al.*, 2017, p. 89). Longitudinal studies entail surveying a sample over a specified period, whereas cross-sectional studies compare measurements from a sample of different cases (Bryman *et al.*, 2014, pp. 106, 109; Van Zyl *et al.*, 2017, p. 89).

Descriptive surveys gather information about groups of people by asking questions and preparing a table with the provided answers. Descriptive surveys aim to obtain information from the groups participating in the surveys that the researcher could generalise (Malhotra *et al.*, 2017, p. 269; Van Zyl *et al.*, 2017, p. 89).

5.4.4. Research purpose selected for this study

Chapter 1 of this study stated its research purpose as exploratory (see section 1.5.2.). Exploration is the process of *"collecting information to formulate or refine management, research, investigative, or measurement questions"* (Cooper and

Schindler, 2006, p. 709). Applying exploration in research enables the researcher to understand the problem identified and search for solutions to this problem. Exploratory studies are usually loosely structured and develop operational definitions and concepts (Cooper and Schindler, 2006, pp. 709–710).

In this study, longitudinal financial data from the published Financial Statements for a sample of 16 universities were collected and analysed for 2010, 2015 and 2019. Longitudinal data are data that are repeatedly collected over time (Mertens, Pugliese and Recker, 2016, p. 17; Creswell and Creswell, 2018, p. 207). The financial data in this study refer to the Financial Statements of the sampled universities that were collected for 2010, 2015 and 2019 (repetitively over time). Specific statistical tools were then applied to the analysed financial data. From the finding of the statistical analysis, recommendations were made to enable universities to make the required changes to improve their cost efficiency. This improvement in cost efficiency is necessary, considering the severity of the disruption faced globally by universities (see Chapter 3). With the analysis of the data collected in this study, the researcher responds to the problem statement in section 1.2., addressing the disruption faced by universities. This study, therefore, is **exploratory research**. The remainder of this section focuses on the specific research method followed in this study, including the data gathering and sampling methods.

5.5. Data gathering

The empirical part of this study required the Financial Statements of the 26 South African universities. Even though Financial Statement data does not necessarily represent the most relevant information for decision-making (see section 2.2.1.) universities are reluctant to share Managerial accounting information due to the sensitivity of the data and the researcher was able to use a bigger sample through the use of Financial Statement data. The Financial Statement data are secondary data in the public domain. However, there were specific challenges related to the data, primarily to ensure the comparability of the data gathered between universities. These problems resulted in a sample of 16 universities selected for this study, to be discussed in section 5.6.3. This section examines the challenges the researcher faced in the data gathering phase.

5.5.1. Financial Statement data

The required Financial Statements of the universities were obtained from the respective universities' websites. The data gathered from these websites had four main challenges, i.e. a) some universities did not have Financial Statements available for all three years required (2010, 2015 and 2019); b) the Financial Statements were obtained in PDF format, and the data had to be transferred into Microsoft Excel; c) some Financial Statements were not split into Restricted and Unrestricted information; and d) some Financial Statements did not indicate the split in Salaries between Academic and Other Salaries. This section addresses these challenges to support the accuracy of the results provided in Chapter 6.

5.5.1.1. Financial Statements for all years not available

Some universities did not have Financial Statements available for all three years under review. If a university did not have Financial Statements available for a specific year, the following year's Financial Statements were used to obtain the required year's data, since Financial Statements must include comparative data. If a university did not have Financial Statements available for two or more years of the years reviewed in the study, the university was not included in the sample (see section 5.6.3.).

Only one university forming part of the final sample did not have Financial Statements for 2015 or 2016. Therefore, this specific university's annual growth rate in Revenue from 2010 to 2014 was determined. This growth rate was then used to adjust the 2014 Financial Statements to derive the 2015 Financial Statement figures.

5.5.1.2. Accuracy of Financial Statement data transferred

The second challenge posing a threat to the accuracy of the results of the empirical part of the study is that the researcher might have transferred the data incorrectly from the Financial Statements to Excel, where the financial analysis of the data was performed. The researcher mitigated this risk by including control figures that calculated specific amounts using the variables that the researcher entered. These amounts were compared to the keyed-in amounts from the Financial Statements, and any differences above one (to compensate for any rounding differences) were flagged and addressed by the researcher. Spot checks were also performed where random Financial Statements were selected, and the figures in Excel were compared to the actual Financial Statements to ensure no differences occurred.

5.5.1.3. Financial Statement figures not differentiating between Restricted and Unrestricted Revenue and Expenses

For some universities, the Financial Statements did not differentiate between Restricted and Unrestricted Revenue and Expenses (see sections 5.6.2.1. and 5.6.2.2.). If the researcher excluded these universities from the sample (see section 5.6.3.), the sample would’ve been too small to extrapolate to the population. The researcher included only two universities in the sample whose Financial Statements did not provide a split between Restricted and Unrestricted funds. For both these universities, the total financial information was included in the analysis. This option was selected after the researcher had determined that, based on the Restricted data available for all the universities in the sample, the effect of including Restricted data for only two universities should not have a significant impact on the results.

5.5.1.4. Salaries not split between academic and other personnel costs

Four universities forming part of the sample only presented the split between Academic and Other Salaries for the total Salary cost (i.e. Restricted + Unrestricted). Since this is a central figure in the analysis of the financial information of the universities, the researcher had to make some assumptions to enable the estimation of the split of the salary costs for these universities.

For these universities, the estimation of the split of the salary costs between Academic and Other Salaries is based on the split between the total (Restricted + Unrestricted) Salary cost. The percentage of the total Salary cost assigned to academic staff and other staff was applied to the total Unrestricted, Council-controlled Salary amount to determine the estimated costs of Academic and Other Salaries, respectively.

The next section looks in more detail at the research method followed in the empirical part of this study.

5.6. Research method

The research method followed in this study is depicted in Figure 1.5 in section 1.5.5. The empirical part of this study entailed the analysis of the Financial Statements of the universities in the sample. In this section, the researcher expands on the exploratory quantitative research performed in this study by detailing all the analyses performed. The analysed financial data were also statistically analysed in terms of descriptive as well as inferential statistics. The discussion of the research method in this section includes an explanation of important terms and concepts used in the empirical study as well as a description of the sample.

5.6.1. Analysis of financial data of South African universities

The Financial Statements of a sample of 16 of the 26 publicly funded universities in South Africa were analysed. The analysis was performed to establish whether these universities managed their costs efficiently, benefiting from Economies of Scale as expected in an environment with primarily fixed costs (see section 4.5.4.). Of the 26 publicly funded universities in South Africa, 20 are Conventional universities (Univ), and six are universities of Technology (UoT). Table 5.2 summarises the 26 publicly funded universities in South Africa.

Table 5.2: South African publicly funded universities

	University Name	Abbreviation	Conventional or Technical university
1	Cape Peninsula University of Technology	CPUT	UoT
2	Central University of Technology	CUT	UoT
3	Durban University of Technology	DUT	UoT
4	Mangosuthu University of Technology	MUT	UoT
5	Nelson Mandela Metropolitan University	NMU	Univ

	University Name	Abbreviation	Conventional or Technical university
6	North-West University	NWU	Univ
7	Rhodes University	RHODES	Univ
8	Sefako Makgatho Health Science University	SMU	Univ
9	Sol Plaatje University	SPU	Univ
10	Stellenbosch University	SU	Univ
11	Tshwane University of Technology	TUT	UoT
12	University of Cape Town	UCT	Univ
13	University of Fort Hare	UFH	Univ
14	University of Johannesburg	UJ	Univ
15	University of KwaZulu-Natal	UKZN	Univ
16	University of Limpopo	UL	Univ
17	University of Mpumalanga	UMP	Univ
18	University of Pretoria	UP	Univ
19	University of South Africa	UNISA	Univ
20	University of the Free State	UFS	Univ
21	University of the Witwatersrand	WITS	Univ
22	University of Venda	UV	Univ
23	University of Western Cape	UWC	Univ
24	University of Zululand	UNIZULU	Univ
25	Vaal University of Technology	VUT	UoT
26	Walter Sisulu University	WSU	Univ

Source: Universities South Africa (2018, paras 1–2).

The researcher gathered Financial Statements for a sample of 16 of the 26 universities listed in Table 5.3 for 2010, 2015 and 2019. Three financial periods were considered;

2010 to 2015, 2015 to 2019 and the entire period from 2010 to 2019. The researcher's decision to look at two separate intervals, i.e. 2010 to 2015 and then 2015 to 2019, as opposed to only considering 2010 to 2019, is due to the #FeesMustFall campaign in 2015. The result of the #FeesMustFall campaign was a shift in the Revenue composition of universities in South Africa. This shift in Revenue composition was discussed in more detail in section 4.2. The Financial Statements for 2020 were explicitly not included in this study to ensure that the effects of the COVID-19 pandemic did not distort the analysis of the financial data of the sampled universities. Section 5.6.3. describes the sample selected in more detail, taking the challenges mentioned in section 5.5.1. into account.

5.6.2. Important terms, concepts, and assumptions

5.6.2.1. Revenue

The financial analysis performed had three focus areas, i.e. Revenue, Expenses, and growth. The Revenue focus area was aligned with the funding streams of universities. In section 4.2., the Revenue streams of universities were discussed as Tuition Fee Income, Government Subsidies and Grants and Third-stream Income. Tuition Fee Income are the fees enrolled students pay for the modules they are enrolled for. Government Subsidies and Grants are primarily categorised as either Block Grants or Earmarked Grants.

Nearly 70% of the government Budget for universities consist of Block Grants. Block Grants are controlled by universities' councils (Council-controlled Funds), which means the university management and council can apply these funds at their discretion. Block Grants are usually applied to cover universities' Operational Costs related to teaching, learning and research (DHET, 2017, p. 4). The Block Grants received are also the only government grant classified as Unrestricted (RSA, 1997, sec. 1). Earmarked Grants are a means to steer the university sector towards set targets. These targets include those set by the enrolment planning exercise and Grants to ensure universities address national priorities (DHET, 2017, p. 6). The Revenue and Expenses used in this study are only those amounts classified in the Financial Statements as Council-controlled and Unrestricted, since these funds relate to the operation of the core service of a university, i.e. teaching and learning. Managing these funds is also at the discretion of the management team of the university. Other funds included in the Financial Statements are Restricted Funds (i.e. all funds not controlled at the discretion of the council) as well as Student and Staff Accommodation Funds (described in this study as Accommodation). Accommodation Funds are all Income (including Council-allocated Funds) and Expenses related to the operation of student and staff accommodation and catering (RSA, 1997, sec. 7.5.2.) Since Accommodation Funds are described as Restricted in the Financial Statements, it falls outside the scope of this study, focusing only on Unrestricted, Council-controlled Funds.

Considering Unrestricted, Council-controlled financial information, the Revenue streams at universities that were investigated for the purpose of this study are a) Subsidies and Grants; b) Tuition Fee Income; and c) Other Income. Other Income consists of all Council-controlled, Unrestricted Income received by a university apart from Subsidies and Grants and Tuition Fee Income. Other Income includes Investment Income and Revaluations.

5.6.2.2. Expenses

Expenses are categorised into three main categories for this study. The first two areas are related to Personnel Costs. Personnel Costs include all Salary-related Expenses identified in the Financial Statements. Personnel costs are divided into Personnel costs related to academic staff and other staff. All Expenses not related to Salaries are grouped as Other Expenses.

5.6.2.3. Average (Mean) versus Weighted average (mean)

Revenue and Expenses were firstly analysed to determine the composition of these items at South African universities. Two measures were used for this analysis. Firstly, the weighted average for each line item for the sampled universities was used. The weighted average adds the line item under review for each sampled university and determines the percentage of this total on the Total Revenue for all sampled universities. The same principle is applied to Expenses. The second measure is the mean composition percentage. The mean is calculated as the sum of the individual compositions (sum of individual %/*n*) of the sampled universities, divided by the number of universities in the sample. The mean is the average of the figure under consideration. For composition, it would be the average of the individual universities' composition of the related variable.

5.6.2.4. Growth

The following analysis performed on the financial data in the sample was to determine the growth of the mentioned Revenue and Expenses. Growth was determined for three intervals. The first interval was from 2010 to 2015. The second interval was from 2015 to 2019. The final interval was for the whole period analysed from 2010 to 2019. Average annual growth over the nine years investigated was also determined.

The calculated Revenue and Expenses growth rate was compared to a combination of inflation and enrolment growth (termed Nominal TIOU growth rate as explained in section 6.3.1.). For inflation, the total South African inflation based on the All items, Total country Consumer Price Index (CPI) for the nine years, starting in 2010 to 2019, was calculated, amounting to 59.41%. This 59.41% consist of 31.18% for the period 2010 to 2015 and 21.52% from 2015 to 2019 (Statistics South Africa, 2022). The growth in the sum of TIUs and TOUs (described by the term TIOUs for the purpose of this study) for the sampled universities was used for enrolment growth. TIOU growth rates for 2010 to 2015, 2015 to 2019 and 2010 to 2019 were calculated for each of the sampled universities.

The Nominal TIOU growth rate was calculated for two separate scenarios. The first scenario takes 100% of the growth in TIOUs into account to determine the effect of growth on university Revenue and Expenses. This scenario is not a true reflection from a Management and Cost accounting perspective, since most costs incurred at universities are fixed and should not change, regardless of a change in the number of enrolments. These results are, however, included to illustrate one extreme of the spectrum of possibilities of the behaviour of costs at universities. The second scenario applied was that a part of the Expenses at a university should change in relation to the number of enrolments, and a part should not be affected. A conservative estimation of 50% was made, and a Nominal growth rate including 50% of the TIOU growth was calculated. Section 4.5.2. provides more detail on why 50% was selected.

The Nominal TIOU growth rates (at 100% and 50% of TIOUs) were also used to determine the Budgeted Revenue and Expenses for the sampled universities. The actual results of 2010 were used as a starting point from which the Nominal TIOU growth rate was used to determine what the Budgeted Revenue and Expense items should have been for 2015 and 2019. The actual results for 2015 and 2019 were compared to the Budgeted results to determine whether the universities performed as expected.

The Budgeted figures calculated enabled the researcher to provide a financial perspective of the sampled universities' financial performance in relation to what was reasonably expected. The analyses were performed in total for the universities in the sample and the individual universities. From the data collected on the individual universities, specific statistical analyses were performed. However, it is essential to understand the sample selected before the specific statistical techniques applied are discussed.

5.6.3. Description of the sample selected

South Africa currently has 26 publicly funded universities divided into 20 Conventional universities (Univ) and six universities of Technology (UoT). The sample for this empirical study comprised 16 universities (12 Conventional universities and four universities of Technology). Although summarised information over the period for all universities is available, this summarised financial data are a) not detailed enough in terms of, specifically, Expenses; b) the summary of Expenses is not comprehensive or grouped similarly for 2010, 2015 and 2019; c) it does not separate Restricted and Unrestricted and Council-controlled Revenues and Expenses; and d) does not provide a split between Academic and Other Salaries. For these reasons, the researcher decided to use the actual Financial Statements of the universities. The circumstances leading to only 16 of the 26 universities being included in this study were a) some universities did not exist or were very small in 2010; b) the Financial Statements for some specific universities were not available for all three financial years (see section 5.6.1.); and c) there was no specific split between Academic Salaries and Other Salaries (referring to Top Management, Service, and Support Staff Salaries) for some universities.

5.6.3.1. Comparing sample to population

The empirical part of this study focused on a sample of 16 out of 26 universities, relying exclusively on the Unrestricted, Council-controlled Revenue and Expenses as mentioned in section 5.6.2. In Tables 5.3 to 5.5, the researcher indicates that this sample is a) big and b) represented enough to justify the sampling decision. In Table 5.3, using TIUs and TOUs as a proxy, a comparison between the sample and the population in terms of enrolments is reflected. TIUs and TOUs are the main criteria indicating the Revenue stream universities generate from Government Subsidies. Since Government Subsidies and Grants comprise the biggest part of Revenue for universities (see section 4.2.), TIUs and TOUs are the most appropriate measurement of the size of both the population and the sample.

Table 5.3: Comparing the TIUs and TOUs of the population and the sampled universities

	Total Teaching Input Units (TIUs)			**Total Teaching Output Units (TOUs)**		
	2010	**2015**	**2019**	**2010**	**2015**	**2019**
Population	1,158,537	1,341,962	1,553,743	134,270	176,164	202,694
Sample	**798,363**	**908,171**	**1,053,193**	**88,194**	**109,562**	**126,307**
% of Population	68.9%	67.7%	67.8%	65.7%	62.2%	62.3%

Table 5.3 indicates that more than 67% of all universities' TIUs and 62% of all TOUs are represented in the sample for this study. Research Output Units (ROUs) were excluded from the empirical part of this study because it represents a small percentage of South African universities' Unrestricted Revenue (7% in 2015 and 8% in 2019). Tables 5.4 and 5.5 compare both the Revenue and Expenses (including the composition of Revenue and Expenses) between the sample and the population for 2015 and 2019 (2010 was excluded because the summary of financial information for the population was not available).

Table 5.4: Average Statement of Comprehensive Income: Population versus sample 2015

Average	2015 R('million)		Sample/ Population	2015 Composition	
	Population (26)	Sample (16)		Population (26)	Sample (16)
Revenue	**2,018.6**	**2,040.1**	**101.1%**	**100.0%**	**100.0%**
Subsidies & Grants	1,033.9	923.9		51.2%	45.3%
Tuition Fee Income	828.0	766.3		41.0%	37.6%
Other Income *	156.7	349.9		7.8%	17.1%
Expenses	**1,946.9**	**1,901.6**	**97.7%**	**96.4%**	**93.2%**
Personnel costs**	1,207.4	1,149.6		59.8%	56.3%
Other Expenses**	739.5	752.0		36.6%	36.9%
Net Surplus	**71.7**	**138.5**		**3.6%**	**6.8%**

**The population universities include Restricted Revenue and Student Accommodation Revenue, while the sample only reflects the Unrestricted Revenue.*

***The population universities include Restricted Expenses and Student Accommodation Expenses, while the sample only reflects the Unrestricted Expenses.*

Table 5.5: Average Statement of Comprehensive Income: Population versus sample 2019

Average	2019 R('million)		Sample/ Population	2019 Composition	
	Population (26)	Sample (16)		Population (26)	Sample (16)
Revenue	**3,401.1**	**2,969.3**	**87.3%**	**100.0%**	**100.0%**
Subsidies & Grants	1,615.7	1,494.9		47.5%	50.3%
Tuition/Fee Income	1,127.3	1,030.4		33.1%	34.7%
Other Income *	658.1	444.1		19.3%	15.0%
Expenses	**2,798.9**	**2,559.0**	**91.4%**	**82.3%**	**86.2%**
Personnel costs**	1,683.2	1,592.5		49.5%	53.6%
Other Expenses**	1,115.7	966.5		32.8%	32.5%
Net Surplus	**602.2**	**410.3**		**17.7%**	**13.8%**

**The population universities include Restricted Revenue and Student Accommodation Revenue, while the sample only reflects the Unrestricted Revenue.*

***The population universities include Restricted Expenses and Student Accommodation Expenses, while the sample only reflects the Unrestricted Expenses.*

Deduced from Table 5.4 is that there were similarities in 2015 regarding Revenue (-1.1%) and Expenses (2.3%) between the population and the sample. On average, the sample is bigger measured by Revenue, because Restricted funding is excluded from the sample. The figures calculated under the composition columns in Tables 5.4 and 5.5 represent the average related Revenue stream or Expense category's portion to Total Revenue. This composition was also determined for the average Net surplus of the population and the sample. There are slight differences in Revenue composition between the population and the sample. The reason for this difference is that the universities excluded from the sample were relatively smaller universities, decreasing the average composition of the population, specifically regarding Other Income where the composition of the sample was 9% higher than the population.

Focusing on Expenses, for 2015, the population's Salaries as a percentage of Total Revenue are 3.5% lower than the sample. A possible explanation could be that Restricted and Accommodation Expenses (excluded from the sample) typically have lower Personnel costs than Unrestricted Expenses. Table 5.5 summarises the findings from analysing the data for the sampled universities in 2019. In Table 5.5, the composition for most Expense categories (including Total Expenses) of the sample was also higher than the population's composition. The following findings, not specifically illustrated in Table 5.5, formed part of the analysis of the 2019 financial data and add to the explanation for the higher composition of the sample's Expense categories:

a) Restricted and Accommodation Revenue comprised only 27.8% of the Total Revenue of the 16 sampled universities;
b) Restricted (37.0%) and Accommodation (15.6%) Personnel costs represented a much lower percentage of the Revenue than Personnel costs for Unrestricted Revenue (53.6%); and
c) Restricted and Accommodation Personnel costs are only 18.5% of Total Personnel costs, as opposed to 27.8% of Total Revenue.

The data associated with the Personnel cost of Restricted and Accommodation Revenue prove that the Personnel costs for the population would be substantially higher if the Restricted and Accommodation data were excluded. In terms of size (Revenue), Expenses and the composition of both Revenue and Expenses, it is thus clear that the sample is representative of the population. In Table 5.5, the population's Revenue (R3 401 million) is higher than the sample (R2 969 million), mainly because Restricted and Accommodation funds are included in the population.

For Expenses and Personnel Costs, the representation of the sample, like Revenue, is lower than the population. The composition, however, is higher than the population. Again, the reason for this representation is that Restricted and Accommodation Expenses explain the lower Expenses and Personnel costs as a percentage of

Revenue for the population. It is the opinion of the researcher that the sample is adequately representative of the population in terms of average size (Revenue) and the composition of both Revenue and Expenses to be used for further empirical analysis. The main differences between the population and the sample could be attributed to the inclusion of Restricted and Accommodation Funds in the population data. Unfortunately, the split between Restricted and Unrestricted data was unavailable for the whole population. The detailed analysis of the financial data of the sampled universities is discussed in Chapter 6. The following section discusses the statistical techniques applied in analysing the financial data obtained in the empirical part of this study.

5.6.4. Statistical analysis

The empirical part of this study looks at two types of financial data. Firstly, the Total Revenue and Expenses for the sampled universities were analysed. Secondly, the data of the individual universities were also analysed. The Total Revenue and Expenses analysed were used for descriptive statistics and the analysis of the individual universities' financial data were used in inferential statistical analyses performed.

5.6.4.1. Descriptive statistics

A researcher applies descriptive statistics to describe the profile of a random variable in terms of characteristics like shape, location and spread (Cooper and Schindler, 2011, p. 718; Wegner, 2016, p. 66). Descriptive statistics serve as an aid to depict the centre, skewness, and dispersion of a data distribution (Wegner, 2016, p. 66). A **data distribution** refers to a descending value count arrangement resulting from preparing a table of variables related to the observed subject (Cooper and Schindler, 2011, p. 423). A **variable** is the varying element of applicable cases that become the basis of data collection and analysis (Bryman *et al.*, 2014, p. 385; Wegner, 2016, p. 5). Descriptive statistics is a tool to introduce and describe the data distribution related to a study (Cooper and Schindler, 2011, p. 423). The descriptive statistics tools used in this study, i.e. Measures of Central Tendency and Measures of Variability, are described in more detail in this section.

5.6.4.1.1. Measures of Central Tendency

Central Tendency is a term used to describe the typical values included in a data distribution. Mean, median and mode are some of the most familiar measures of Central Tendency (Cooper and Schindler, 2011, p. 425; Wegner, 2016, p. 66). In this study, the mean was used to determine the Central Tendency of the Financial Statement data related to the sampled universities in section 6.2.

According to Cooper and Schindler (2011: 425), the mean is *"the average response".* Equation 5.1 is used to calculate the mean of a data distribution (Cooper and Schindler, 2011, p. 425; Wegner, 2016, p. 67):

Equation 5.1: Mean of a data distribution

$$\bar{x} = \frac{\text{Sum of all observations}}{\text{Number of observations}} = \frac{\sum_{\mathrm{i}=1}^{\mathrm{n}} x_{\mathrm{i}}}{\mathrm{n}}$$

In the above equation:

$\bar{x}$ = The arithmetic mean of the sample.

n = The number of data values included in the sample.

x_{i} = The i^{th} data value of a random variable x.

$\sum_{\mathrm{i}=1}^{\mathrm{n}} x_{\mathrm{i}}$ = The sum of the total number of data values (n).

The middle value of a descending data distribution represents the median (Cooper and Schindler, 2011, p. 425; Wegner, 2016, p. 68). This middle value implies that half of the observations of a study are lower and the other half higher than the median (Cooper and Schindler, 2011, p. 425; Wegner, 2016, p. 68). Mode is the value that occurs most often in a data distribution (Malhotra *et al.*, 2017, p. 917).

5.6.4.1.2. Measures of variability (dispersion)

Standard deviation, variance, range, quartile deviation and interquartile range are all measures of variability (dispersion or spread). These measures determine how *"scores cluster and scatter in a distribution"* (Cooper and Schindler, 2011, p. 426). The method a researcher applies to measure the variability of a data set determines the level of confidence applicable to the central location measurement (Wegner, 2016, p.

79). The researcher used standard deviation as a measure of variability in this study (also refer to skewness and kurtosis discussed in section 5.6.5.1.).

5.6.4.1.2.1. Standard deviation

The standard deviation of a data distribution is a measure of the typical distance between the data sets and the mean of the distribution (Cooper and Schindler, 2011, p. 426; Bryman *et al.*, 2014, p. 319; Wegner, 2016, pp. 80–81). Standard deviation is a popular measure widely used due to the simplicity of interpreting the measure results. Both the mean and the standard deviation tend to be distorted by outliers (Cooper and Schindler, 2011, p. 429; Wegner, 2016, p. 83). According to Mertens *et al.* (2016, p. 138), outliers refer to extreme cases or scores (values) in a data distribution. To calculate the standard deviation of a data distribution, the variance of the distribution must first be determined. The variance is a *"measure of score dispersion about the mean"* (Cooper and Schindler, 2011, p. 426). Equation 5.2 is the formula to determine the variance of a data distribution (Cooper and Schindler, 2011, p. 426; Wegner, 2016, pp. 80–81):

Equation 5.2: Calculation of the variance of a data distribution

$$Variance = \frac{Sum\ of\ the\ squared\ distances\ from\ mean\ for\ all\ cases}{(Number\ of\ cases - 1)}$$

Equation 5.2 is expressed in mathematical terms as follows:

Equation 5.3: Mathematical formula for the variance of a distribution

$$s^2 = \frac{\sum_{i=1}^{n}(x_i - \bar{x})^2}{n-1}$$

In Equation 5.3:

s^2 = Variance

$\bar{x}$ = Mean

x_i = Individual value

n = Number of observations

Using the calculated variance from Equation 5.2 and 5.3, Equation 5.4 shows the calculation of the standard deviation(s) (Cooper and Schindler, 2011, p. 426; Wegner, 2016, p. 81)*:*

Equation 5.4: Standard deviation of a data distribution

$$s = \sqrt{s^2}$$

In Equation 5.4:

s = Standard deviation

s^2 = Variance

The results of the standard deviation calculation can now be used to determine whether there is sufficient variation in the collected data (Mertens, Pugliese and Recker, 2016, p. 28). A *"reasonably high"* standard deviation indicates a high number of low or high values. A low standard deviation indicates that most values are centred around the mean and could indicate problems surrounding statistical testing. These problems that might be encountered in statistical testing are due to the requirement of a variety of independent variable values, specifically when estimating or predicting the dependent variable values (Mertens *et al.*, 2016, p. 28). The following section discusses the inferential statistical tools applied in this study which includes tools to estimate or predict dependent variable values.

5.6.5. Inferential statistics

The second part of the statistical analysis performed in this study relates to inferential statistics. The primary inferential statistical tools applied were one sample *t* tests, and regression analysis (including correlation). Each of these tools is described in more detail in this section. However, the basis for classical statistical inference is that a data distribution is symmetrical in appearance and bell shaped (Malhotra *et al.*, 2017, p. 446). Measures of shape are, therefore, the starting point when considering the inferential statistics applied in this study.

5.6.5.1. Measures of shape

The measure of shape of a data distribution is a measure of how data scores depart from a symmetric distribution. The measure of shape also indicates how relatively flat or peaked a data distribution is, i.e. the shape of a data distribution (Cooper and Schindler, 2011, p. 427; Malhotra *et al.*, 2017, p. 564). A data distribution's shape is measured by examining its skewness and kurtosis (Malhotra *et al.*, 2017, p. 564). For this study, skewness and kurtosis were primarily used to test the normality of the data distributions of the variables used. These normality tests were based on the Shapiro-Wilk test using Statistical Package for the Social Sciences (SPSS) software and are described in detail in section 6.5.

Skewness indicates a specific variable's deviation from a symmetric distribution (Cooper and Schindler, 2011, p. 427; Wegner, 2016, p. 86). Equation 5.5 indicates the formula to calculate the skewness of a data distribution (Cooper and Schindler, 2011, p. 427; Wegner, 2016, p. 86):

Equation 5.5: Formula to calculate the skewness of a distribution

$$sk = \frac{n}{(n-1)(n-2)}\sum\left(\frac{x_i - \bar{x}}{s}\right)^3$$

In Equation 5.5:

sk = Pearson's coefficient of skewness

$\bar{x}$ = Mean

x_i = Individual value

n = Number of observations

s = Standard deviation

If a data distribution is symmetrical, *sk* equals 0 (Cooper and Schindler, 2011, p. 427; Wegner, 2016, p. 86). A positive *sk* value indicates a positively skewed distribution. A negative *sk* value indicates a negatively skewed data distribution (Cooper and Schindler, 2011, p. 427; Wegner, 2016, p. 86). If the mean of a data distribution is higher than the median, which in turn is higher than the mode, a data distribution is positively skewed. A positively skewed data distribution consists of a few very large observations with a larger number of relatively small observations (Wegner, 2016, p. 85). In a data distribution that is negatively skewed, the mean is smaller than the median, and the median is smaller than the mode. The data set contains a few smaller observations and many large observations (Wegner, 2016, p. 85).

Kurtosis measures the curve of a data distribution's relative peakedness or flatness as defined by the frequency distribution (Malhotra *et al.*, 2017, p. 915). When a data distribution is normal, kurtosis equals zero. Positive kurtosis indicates that a data distribution is more peaked than normal. A negative kurtosis value indicates a flatter data distribution than normal (Malhotra *et al.*, 2017, p. 565). The following formula illustrates the calculation of kurtosis (Admin, 2022, para. 1):

Equation 5.6: Calculating kurtosis

$$k = \frac{\sum(x_i - \bar{x})^4}{n\sigma^4}$$

In Equation 5.6:

k = Kurtosis of a data distribution

x_{i} = Individual value

$\bar{x}$ = Mean

σ = Standard deviation

n = Number of observations

The results of the Shapiro Wilk tests performed in this study are provided in section 6.5. The Shapiro-Wilk test returns a significant result if the distribution of the data under review is not normally distributed (Mertens *et al.*, 2016, p. 148).

5.6.5.2. One sample *t* test

Once the normality of the data distributions of the related variables is established, one sample *t* tests can be applied to these variables. "*A t test calculates the difference between two group means and compares it to the average distance of all data points to the mean"* (Mertens *et al.*, 2016, p. 8). A *t* test is further described as a univariate hypothesis test that uses the *t* distribution. A *t* distribution is a data distribution that is symmetrical, and bell-shaped, similar to a normal distribution. A *t* distribution is specifically useful for testing samples smaller than 30 (n<30) (Malhotra *et al.*, 2017, p. 582).

According to Malhotra *et al.* (2017, p. 582) there are eight steps that should be followed when testing hypotheses using the *t* statistic as is present with a *t* test. The testing performed in Chapter 6 (see section 6.6. and 6.7.) followed these steps.

1. Formulate the null (H_0) and corresponding alternative (H_a) hypotheses.
2. Select the most appropriate formula to calculate the *t* statistic. For the empirical part of this study, a single variable was tested against a known test value and a one sample *t* test was accordingly performed applying the following formula (Davis, Pecar and Santana, 2014, p. 332; Malhotra *et al.*, 2017, p. 582):

Equation 5.7: One sample t test

$$t = \left(\frac{\bar{x} - \mu}{s_{\bar{x}}}\right)$$

In Equation 5.7:

t = *t* statistic

$\bar{x}$ = Sample mean

μ = Population mean (specified as the test value)

s = Standard deviation of the sample mean

3. Select a significance level, α (typically 0.05), to test H_0.
4. Take the appropriate number of samples (one sample for the purpose of this study) and calculate each sample's mean and standard deviation.
5. From the assumption that H_0 is true, calculate the *t* statistic (the *t* statistic is the test statistic for a one sample *t* test). A test statistic is a calculated quantity determined from the data in the sample that measures the distance of a sample statistic and the hypothesised parameter (Davis *et al.*, 2014, p. 318).
6. Calculate the critical value of the *t* statistic. The critical value defines the range of possible values that the test statistic can be where the null hypothesis will be rejected (Davis *et al.,* 2014, p. 318). The critical value is a quantile associated

with the sample size of the values used in determining the test statistic and the selected level of significance (α) (Davis al., 2014, p. 318).

7. Reject H_0 if the *t* statistic (step 6) is larger than the critical value (step 7). If the opposite is true (*t* statistic < critical value) do not reject H_0.
8. Express the conclusion of the *t* test in terms of the stated hypothesis.

H1 to H8 as stated in Chapter 6 (section 6.6.) was tested using one sample *t* tests explained. To test H9 to H11, correlation and regression were applied (section 6.8.).

5.6.5.3. Correlation and regression

Regression is used to determine which independent variables explain the significant change in the dependent variable under consideration. Regression also explains the form, structure, and strength of the relationship between variables and can assist to predict the dependent variable values (Malhotra *et al.*, 2017, p. 234). However, understanding the Pearson correlation coefficient is fundamental to regression analysis (Malhotra *et al.*, 2017, p. 234).

5.6.5.3.1. Pearson correlation coefficient

Applying regression models provides a more accurate estimation of the relationship between variables. This estimation takes place using the principle of correlation (Mertens *et al.*, 2016, p. 22). Correlation is the simplest way to understand how two metric (ratio- or interval-scaled) variables are associated (Malhotra *et al.*, 2017, p. 632). Correlation measures the distance between the plots on a scatter graph and a straight line (Mertens *et al.*, 2016, p. 22). It is a measure of the strength of the linear association between two numeric values forming part of the same sample (Cooper and Schindler, 2011, p. 493; Mertens *et al.*, 2016, p. 23; Wegner, 2016, p. 335; Malhotra *et al.*, 2017, p. 635). In this study, the Pearson correlation coefficient was used.

The Pearson correlation coefficient ranges from +1 to -1. The value associated with the correlation coefficient (+1 to -1) is presented by *r.* The value (*r*) of the correlation coefficient is a measure of the direction and degree of the relationship between values (Cooper and Schindler, 2011, p. 493; Malhotra *et al.*, 2017, p. 634). The direction of the correlation value measures the level of either opposed (-) or unified (+) interaction between the variables under consideration (Cooper and Schindler, 2011, p. 493; Edmonds and Kennedy, 2017, p. 125). A positive value indicates a positive correlation which means that the increase in one variable will also indicate an increase in the second variable. When the *r* value is negative, it is an indication that the correlation is negative, with an increase in one value leading to a decrease in the second value (Cooper and Schindler, 2011, p. 493; Mertens *et al.*, 2016, p. 22; Wegner, 2016, p. 337). Equation 5.8 contains the formula to calculate the correlation coefficient (*r*) (Malhotra *et al.*, 2017, p. 635).

Equation 5.8: Pearson correlation coefficient

$$r = \frac{\sum_{i=1}^{n}(X_i - \bar{X})(Y_i - \bar{Y})}{\sqrt{\sum_{i=1}^{n}(X_i - \bar{X})^2 \sum_{i=1}^{n}(Y_i - \bar{Y})^2}}$$

In Equation 5.8:

r = The sample correlation coefficient

X_i = Independent variable values (an independent variable affects the dependent variable) (Cooper and Schindler, 2011, p. 720))

Y_i = Dependent variable values (a dependent variable is the variable under observation that should change by expectation when the independent variable changes) (Cooper and Schindler, 2011, p. 717)

$\bar{X}$ = Independent variable sample mean

$\bar{Y}$ = Dependent variable sample mean

5.6.5.3.1.2. Testing the significance of r

When applying statistical analysis, the statistical significance (*p*-value) of a sample must always be established. If the relationship between variables in a sample is real and not just due to chance, the sample is statistically significant (Cooper and Schindler, 2011, p. 454; Mertens *et al.*, 2016, p. 3; Wegner, 2016, p. 340). To determine statistical significance, the *p*-value of a sample is compared to a predefined alpha value (α = level of acceptance). The alpha value is the point at which the *p*-value is too small to be caused purely by chance (Mertens *et al.*, 2016, p. 3). Testing for statistical significance takes place in five steps (Cooper and Schindler, 2011, p. 462; Wegner, 2016, p. 341):

Step 1: State the null and alternative hypotheses.

Step 2: Determine the region of acceptance of the stated null hypothesis. To establish the region of acceptance of the null hypothesis, the significance level, and degrees of freedom for the Critical *F*-value (*F*-crit) test as determined by applying Equation 5.9 are required.

Equation 5.9: Critical *F*-value

$$F - crit = F_{(\alpha)(k-1,N-K)}$$

Where:

F – crit	= Critical *F*-value
k	= Number of samples
N	= Total (combined) sample size

Determining the acceptable level of significance should occur before data collection in a study. The two most widely used significance levels are 0.05 and 0.01. The selected level of significance is dependent on how much risk a researcher is prepared to accept. The *F*-value as applied in this study was calculated using SPSS.

Step 3: Calculate the sample test statistic (*F*-stat) by applying Equation 5.10:

Equation 5.10: Sample test statistic

$$F - stat = \frac{MST}{MSE}$$

In the above equation:

F – stat	= Sample test statistic
MST	= Mean square treatment
MSE	= Mean square of error

The *F*-stat states whether there is a difference between the related groups, but does not specify the size of the difference or where the difference is (Mertens *et al.*, Pugliese and Recker, 2016, p. 12).The *F*-stat is compared to the *F*-crit to determine the significance. Typically, if the *F*-stat is higher than the *F*-crit, the null hypothesis is rejected, depending on the region of acceptance. This process is performed using SPSS software for the purpose of this study, taking the determined region of acceptance into account.

Step 4: Compare the sample test statistic to the region of acceptance.

The researcher used SPSS to compare the sample test statistic to regions of acceptance. The results in SPSS were derived by selecting a 5% level of significance ($\alpha = .05$).

Step 5: Interpret the test.

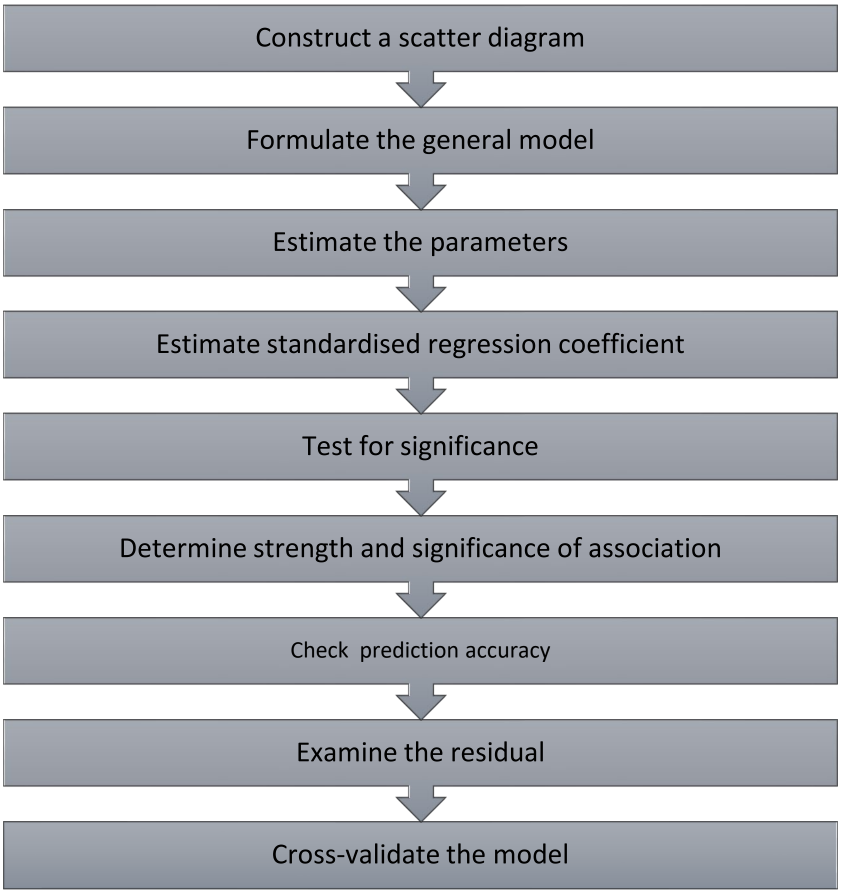
The researcher will reject the null hypothesis when the calculated *F*-stat value is larger than the critical (*F*-crit) value. This process is referred to as testing statistical significance. The interpretation of statistical significance is used to draw statistical as well as managerial conclusions (Cooper and Schindler, 2011, p. 462; Wegner, 2016, p. 341).

5.6.5.3.2. Bivariate regression analysis

Regression models are applied as a statistical tool when a researcher wants to determine how one or more independent variables relate to a dependent variable (Mertens *et al.*, 2016, p. 24). An independent variable (*x*) is a variable that is used to predict the value of a dependent variable (*y*) (Mertens *et al.*, 2016, p. 33). Independent variables are also referred to as predictor variables (Mertens *et al.*, 2016, p. 33). A dependent variable is then the outcome or result of the independent variable's influence (Creswell and Creswell, 2018, p. 93). Regression models are used to a) predict a dependent variable based on independent variables; b) establish whether a specific independent variable influences a dependent variable; c) determine the independent variables to be considered in predicting a dependent variable; and d) reveal the level of importance of independent variables in the explanation and prediction of dependent variables (Davis *et al.*, 2014, p. 411; Mertens *et al.*, 2016, p. 24). Bivariate regression derives at a mathematical relationship (equation) between a single predictor, or metric-independent variable and a single metric-dependent variable (Malhotra *et al.*, 2017, p. 641).

Bivariate regression was applied in this study to determine the dependence of universities' Revenue and Expenses on growth in TIOUs. This dependence is critical to understand the impact of the disruptions discussed in Chapter 3 on the future financial sustainability of universities. The steps to conduct bivariate regression analysis are described in Figure 5.1.

Figure 5.1: Steps in conducting regression analysis



Source: Davis *et al.* (2014, p. 435); Malhotra *et al.* (2017, p. 643).

Each of the steps to conduct a regression analysis is briefly described in this section. The regression analysis performed in Chapter 6, however, was performed using SPSS and the steps were indirectly followed by the software.

Plot the scatter diagram – A scatter diagram is used to determine the form of the relationship between the dependent (vertical axis) and independent (horizontal axis) variables (Malhotra *et al.*, 2017, p. 644). The main purpose of the scatter diagram is to determine whether the relationship between variables is linear as an assumption for the application of regression analysis (Davis *et al.*, 2014, p. 435). Plotting variables on a scatter diagram can easily identify possible problems by identifying unusual combinations of the two variables (Mertens *et al.*, 2016, p. 142; Malhotra *et al.*, 2017, p. 644). A scatter diagram in regression analysis is further used to determine the straight line that is the best fit for the data. The scatter diagram indicates whether the relationship between the dependent and independent variables can be regarded as a straight line, making the application of bivariate regression suitable (Mertens *et al.*, 2016, p. 142; Malhotra *et al.*, 2017, p. 645).

Formulate the general model – When applying bivariate regression analysis, the formula for a straight line is as follows (Davis *et al.*, 2014, p. 412; Wooldridge, 2016, p. 24; Malhotra *et al.*, 2017, p. 645):

Equation 5.11: Bivariate regression model straight line formula

$$y = \beta_0 + \beta_1 x + e_i$$

In Equation 5.11:

y = Dependent variable

x = Independent variable

β_0 = Line intercept

β_1 = Line slope

e_i = Error term (residual)

From Equation 5.11, Y can be predicted if β_0 and β_1 are known figures (Malhotra *et al.*, 2017, p. 645). Unfortunately, very few relationships are entirely predictable and regression analysis, therefore, adds an error term to the regression equation (Malhotra *et al.*, 2017, p. 645). The error term is defined as the "*unsystematic"* part of the variance in an observation. This unsystematic observation is assumed unrelated to any other observations forming part of the model (Mertens *et al.*, 2016, p. 146; Wooldridge, 2016, p. 24). The error term typically provides for factors influencing the prediction of the dependent variable apart from the independent variable (Mertens *et al.*, 2016, p. 82). The next step in the regression analysis is to determine the β_0 and β_1 parameters.

Estimate parameters – Parameters β_0 and β_1 in most regression models are unknown. These parameters can be estimated from the observations in a sample by applying Equation 5.12 (Malhotra *et al.*, 2017, p. 645).

Equation 5.12: Equation to estimate parameters

$$\hat{Y}_i = a + bx_i$$

The variables in Equation 5.12 are as follows:

$\hat{Y}_i$ = Predicted dependent variable value

x_i = Independent variable value

a = Vertical axis intercept (β_0)

b = Slope of the straight line (β_1)

Once the parameters have been estimated based on the raw data, the data can now be standardised (Malhotra *et al.*, 2017, p. 646).

Estimate the standardised regression coefficient – Standardisation of data entails the normalisation of data in order to measure the dependent as well as independent variables on the same scale (Mertens *et al.*, 2016, p. 30). The standardisation of data for the purpose of this study was done by stating all Differences between Budgeted and Actual figures as a percentage of the Budgeted figure. Since only standardised data were used, the calculated regression coefficient was the standardised regression coefficient.

Test for significance – In regression, typically a two-tailed test is performed. The hypothesis to test significance is as follows:

H_0: $\beta_1 = 0$

H_1: $\beta_1 \neq 0$

The null hypothesis states no linear relationship between the dependent and independent variables with the alternative hypothesis stating there is a linear relationship. To establish the significance a *t* statistic with n – 2 degrees of freedom is used (see Equation 5.7). If the *t* statistic is greater than the critical value, H_0 is rejected establishing that there is a significant linear relationship between the dependent and independent variables (Malhotra *et al.*, 2017, p. 647).

Determine strength and significance of association – Part of the statistical inference determined through regression analysis is the strength and significance of the association between the dependent and independent variables (Malhotra *et al.*, 2017, p. 647). Using regression analysis can only describe the relationship between a dependent and independent variable. However, the variability between these two types of variables consists of variability accounted for or explained by the regression line and unexplained variability indicated by residuals (error terms) (Davis *et al.*, 2014, p. 423). The relationship between the dependent and independent variable as determined by a regression model is indicated by the Coefficient of determination (*R^2).*

R^2 is a value that indicates the proportion of the variance in the dependent variable that can be explained by a change in die independent variable. *R^2* is therefore used to evaluate the *"goodness-of-fit'* of the regression line to the data (Davis *et al.*, 2014, p. 423). Equation 5.13 illustrates the formula to determine the *R^2* of a regression model.

Equation 5.13: Coefficient of determination (R^2)

$$R^2 = \frac{SST - SSE}{SST} = 1 - \frac{SSE}{SST} = 1 - \frac{\sum_{i=1}^{n}(\hat{Y}_i - \bar{Y}\,)^2}{\sum_{i=1}^{n}(Y_i - \bar{Y})^2}$$

Source: Davis *et al.* (2014, p. 423).

The value of *R^2* always lies between 0 and 1 (O ≤ *R^2 ≤ 1).* If the value of *R^2* is close to 1, it implies that the model is appropriate for explaining and predicting the dependent variable under consideration. If *R^2* is close to 0, the model is not appropriate for the data considered (Davis *et al.*, 2014, p. 424). If the relationship between a dependent and independent variable is significant, the independent values can be predicted by the dependent values; hence, the accuracy of the prediction should be estimated (Malhotra *et al.*, 2017, p. 650).

Check prediction accuracy – The prediction accuracy of the regression model used in this study was confirmed using a scatterplot. Figure 7.1 illustrates the plots for the dependent variable at various levels of the independent variable. These plots are all still on a straight line confirming the accuracy of the prediction of the dependent variable.

Examine the residual (error term) – This step was performed in SPSS. Under the linear regression option, the residuals were selected as the *y*-axis value and a residual plot was created. These residual plots for all regression models applied in this study were randomly distributed and, therefore, unrelated to the independent variables in the applicable regression models (Mertens *et al.,* 2016, p. 146).

Cross-validate the model – The regression models applied in this study were cross-validated by selecting new, random samples in SPSS and comparing the regression models for the new samples to the initial regression models. For this study, the full available sample of 16 universities was used in the regression analysis performed. For cross validation, a smaller sample was selected using the SPSS data selector and an 80% selection percentage. Each regression analysis was now re-performed using the smaller sample. The smaller sample regression model (80%) was then used to predict the values for the full sample. A correlation was performed to determine the correlation between the predicted values and the actual values. The Pearson correlation coefficient was high (>0.5) for all three regression models, indicating a strong, positive relationship between the actual values and the predicted values using the smaller sample, safely confirming the accuracy of the regression models used in this study. Table 5.6 indicates the correlations between the predicted values and the actual values:

Table 5.6: Correlation between Actual and Predicted values of smaller sample for cross-validation purposes

	Predicted Values (80% sample)	
Factor (using only the 80% sample):	**Pearson Correlation**	**Sig.**
Difference between Actual and Budgeted Revenue	.619	0.032*
Difference between Actual and Budgeted Expenses	.776	0.003**
Difference between Actual and Budgeted Revenue	.780	0.003**

*****Significant at <1%; *Significant at <5%***

Regression analysis is dependent on various assumptions. These assumptions are listed below followed by an explanation of how the researcher ensured these assumptions were followed in the testing performed in this study. The three main assumptions on which regression analysis rely, according to Mertens *et al.* (2016, p. 144) are:

a) Sufficient independence of independent variables and independence of error terms (i.e. no multicollinearity)
b) Normality of error term distribution
c) Homoscedasticity of errors (i.e. homogenous at different values of the independent variable)

Testing for independence for regression analysis entails checking whether the error terms are unrelated and whether the independent variables are not too highly correlated (Mertens *et al.,* 2016, p. 146). The independence of the error terms entails that observations have been drawn independently (Malhotra *et al.*, 2017, p. 649). These error terms must also be normally distributed. However, since the data for this study were collected at the same time, the independence of errors assumption is not a problem (Davis *et al.*, 2014, p. 433).

The following vital assumption to apply regression analysis is the issue referring to multicollinearity. Multicollinearity exists where the overlap between what two variables measure is high (Mertens *et al.*, 2016, p. 146). For this study, the application of bivariate regression means the impact of one independent variable on a dependent variable is tested per regression model, eliminating multicollinearity leaving only the assumption surrounding homoscedasticity. Homoscedasticity refers to the variance in the dependent variables that should be homogenous (Davis *et al.*, 2014, p. 434; Mertens *et al.*, 2016, p. 148). This assumption was tested using the scatterplot function in SPSS when the regression analysis was performed. The scatter plots of the variables were inspected to determine that each distribution had the shape of "*a reasonably boxed cloud*" (Davis *et al.*, 2014, p. 434; Mertens *et al.*, 2016, p. 149).

The results of both the descriptive and inferential statistical analyses performed in the empirical part of this study is provided in Chapter 6. All these analyses are, however, reliant on the ethical behaviour of the researcher.

5.7. Ethical considerations

The two main ethical concerns relevant to this study are the sensitivity of the data presented, since it relates to the financial performance of the publicly funded universities of South Africa and the accuracy of the results. To protect the universities forming part of this study, all results were anonymised.

The second ethical consideration pertains to the accuracy of the results presented. Section 5.5. details the steps the researcher took in ensuring the data captured are accurate. However, there is a risk that the results in the Financial Statements published might not be accurate. Concluding on the accuracy of the Financial Statements of universities falls outside the scope of this study; the researcher relied on the audited financial information published by universities as required by the *Higher Education Act, 1997* (RSA, 1997, sec. 2.2.1.).

The accuracy of the Financial Statements used could inhibit the comparability of financial information as required for the empirical analyses performed in this study. The Financial Statements used were prepared based on the International Financial Reporting Standard (IFRS) in accordance with section 41 of the *Higher Education Act, 1997* (Act no. 101 of 1997), amended by *Act 54 of 2000* (RSA, 1997, sec. 41). According to the old and updated Conceptual Framework included in IFRS, the qualitative characteristics of Financial Statements include comparability (International Accounting Standards Board (IASB), 2014, para. QC19, 2021, para. 2.23). Comparability includes comparing Financial Statements for the same organisation with another period or year as well as comparing the Financial Statements for an organisation with similar organisations (IASB, 2014, para. QC20, 2021, para. 2.24). Part of the 2003 amendments to the *Higher Education Act no. 101 of 1997* is that Financial Statements of universities should be reliable and comparable (RSA, 1997, sec. 2.2.3.1.)

The researcher therefore relies on the decisions taken by the preparers of the Financial Statements to ensure comparability. Any opinion related to the actual comparability or reliability of the Financial Statements of universities falls outside the scope of this study.

5.8. Summary

This chapter provided detail on the research methodology followed in this study as well as the research method for the empirical part of this study. The researcher applied a positivism paradigm to the research performed in this study. The research is also quantitative and exploratory.

The empirical study that follows in Chapter 6 involves analysing the audited Financial Statements of the selected sample of 16 from the 26 publicly funded universities in South Africa to establish the cost efficiency of these organisations. The financial data analysis also established the measure in which Economies of Scale was achieved by the universities in South Africa. These analyses focused on Revenue and Expenses and involved a comparison of the individual universities' financial results from 2010 to 2015, 2015 to 2019 and from 2010 to 2019. The analyses also compared the results of the various universities in the higher education sector. The important terms, concepts and assumptions applied in the empirical part of this study were described in this chapter. This chapter also explained the tools used in the statistical analyses performed during the empirical testing.

The closing section of this chapter explained the ethical concerns the researcher identified in performing the empirical study. The main ethical concerns were addressed by anonymising the 16 sampled South African universities and relying on the audited Financial Statements prepared by applying IFRS. The following chapter contains an in-depth discussion of the results of the empirical part of this study.

Chapter 6 – Empirical findings of the analysis of the Financial Statements of universities

6.1. Introduction

Globally, traditional universities face several disruptions that affect their management of finances, sustainability and, ultimately, relevance. These disruptions include, as discussed in Chapter 3, technological disruption, the 4IR, intellectual commercialisation, the COVID-19 pandemic and disruptions caused by high Tuition Fees and the slow pace of change, as is characteristic of universities. The primary purpose of studying the financial performance of universities in South Africa from 2010 to 2019 was to establish the extent to which South African universities are, from a financial point of view, managed well to ensure efficiency. Universally, most universities would highlight on their web pages and strategies variations of *“research-led”,* “*research university”*, *“world-leading centre of learning, teaching and research”, “research intensive”, “internationally distinguished for research”* and *“student-centred”* as their key strategic focus (Staff writer, n.d. a, para. 1; n.d. d, para. 1; n.d. e, para. 1; n.d. b, para. 1; n.d. f, para. 1). Although these strategic issues are important, it is the opinion of the author that the strategic focus should also differentiate the organisation from similar organisations in the industry. Unfortunately, the concepts *“research-driven”* and *“student-centred”* do not differentiate universities from one another. Within the current international environment of higher education, the factors that will distinguish universities from one another centre around the need for ***relevant and employable skills*** at an ***affordable cost.*** Focusing on the rapidly changing environment caused by the 4IR and the onset of the 5IR, fast-tracked by COVID-19, universities need to adapt their focus in terms of both ‘How’ and ‘What’ they teach. Open-source, blended, and distance education are all increasing rapidly, seriously impacting traditional on-campus and face-to-face learning (see section 3.5).

Another phenomenon is that universities internationally have increased their Tuition Fees above inflation over the last decade, making higher education almost unaffordable for the average student (see section 4.2). Although universities typically are not-for-profit (publicly funded) organisations, proper financial management is essential to ensure affordable higher education as well as sufficient resources to adapt to the rapidly changing needs of the global business environment. Universities must adapt to ensure they remain relevant, assuring the employability of the skills they provide students. Universities are notorious for adapting too slowly to the changing needs of the industry and students (Hattingh, 2016, p. 1; Menon and Castrillon, 2019, para. 3). If universities want to survive, the strategic focus cannot be only *"research-driven"*, *"student-centred"* and providing traditional face-to-face learning. Universities need to adapt from purely on-campus and face-to-face learning, since online education is here to stay and the two new key concepts in higher education must be *affordable education* that *ensures employability* (Smit and Serfontein, 2019, p. 1332). This is especially true in South Africa with high levels of unemployment. South Africa is known as one of the most unequal countries in the world from the perspective of the distribution of Income with a Gini coefficient (last measured in 2014) of 63% (Editorial, 2022a, para. 4).

Management and Cost accounting provides the tools to enable South African universities to manage their scarce resources optimally to a) limit the increase in Tuition Fees, and b) to provide relevant qualifications to ensure employability. This implies that academic staff need to refocus not only on 'What' they teach (to ensure employability), but also on 'How' they teach (to stay relevant in an online and open-source environment) (Smit and Serfontein, 2019, p. 1332). This could also lead to the scaling down of certain departments and upscaling others, including retraining academic staff to address the changing skills needed in the new world. Business as usual is not an option for universities with global warnings that the future of many traditional universities is in jeopardy. Unfortunately, research indicating how to solve the problem regarding the sustainability of universities remains limited. Two critical issues addressed in this study are a) to assess whether resources from a financial management point of view are optimally used and managed at South African universities; and b) to identify possible reasons for the escalating Tuition Fees over the past decade.

Universities, like almost all service organisations, have a few outstanding characteristics from a Management and Cost accounting perspective. Firstly, most of their costs are fixed or period costs, implying that they should benefit much more than retail or manufacturing industries from Economies of Scale due to a high operating leverage (see section 4.5.4.). This characteristic of service organisations has two implications, namely a) it is easy to improve the profitability if the sales volume increases, but b) it is very difficult to sustain viability if the sales volume declines. For universities to survive if student numbers decline in the current disruptive environment will be difficult. The second characteristic is the limited causal input-output relationship in service organisations, given the fixed nature of costs (see section 2.4.3.). Traditional Management and Cost accounting was developed in a manufacturing environment where most of the costs are variable and directly linked to manufacturing costs, with a clear input-output relationship in contrast to service organisations. As discussed in section 2.4.2., currently, most organisations in the world are service related, thus limiting the value Management and Cost accounting tools (including Budgeting) could add to the optimal management of costs. When considering universities as service organisations, another factor to consider is that the salary component at universities typically exceeds 50% of their total costs. In a country such as South Africa with some of the most rigid labour laws in the world, Salaries could predominantly be regarded as a fixed cost, impacting the risk of scaling down and/or refocusing (Bowen, 1980, p. 98; Terzioglu and Chan, 2013, p. 34; Serfontein, 2019, p. 9).

Although academic costs are predominantly fixed costs, academic departments and faculties are the only Profit centres at a typical university, with a direct input-output relationship (see section 4.5.2.). This phenomenon has two implications. Firstly, it is easier to manage academic costs using Management and Cost accounting principles, because the allocation of the academic Budget typically depends on outputs in terms of tuition and research. Revenue, hence, is influenced by a direct input-output relationship. Secondly, an increase in student numbers in existing modules does not necessarily lead to the same increase in Expenses, as opposed to presenting a new module. This refers to the classic economic principle of Economies Of Scale, which is the core driver of efficiency and profitability in almost all service organisations. The role of enrolments in the profitability of universities is confirmed by Serfontein (2019,

p. 165), who proves that the number of enrolments explains 78.1% (sig. = .000**) of the direct profitability (contribution) of a module, irrespective of the level the module is presented (undergraduate versus postgraduate), the funding weight of the department, or the number of credits assigned to a module.

For this study, focusing on the cost efficiency at South African universities, it is important to define the cost objective for the classification of costs. The cost objective for the purpose of this study is the core function of a university, i.e. academic activities. Academic costs/Expenses are the only costs directly related to the core function of a university and are the only costs that are directly associated with generating Revenue. The Indirect costs of a university, according to this cost objective, are all the other costs of running the university, including the Salaries of top management, and service and support departments (thus Indirect costs to the primary cost objective calling it ***Overhead costs*** for convenience purposes). Although the line between academic and Overhead costs is not always clear, only academic departments and faculties are Profit centres, while the Overhead functions are all Cost centres, making it easier to differentiate between academic and Overhead costs.

As early as the 1980s, Smit (1989, p. 326) established that Overhead costs increased at selected South African companies by almost eight percentage points as a percentage of total costs (from 21.80% in 1978 to 29.74% in 1988) and that the main reason for this phenomenon was the inability of conventional Management and Cost accounting to manage the efficiency of these Overhead costs in the absence of a causal relationship between inputs and outputs. This lack of causality is due to Overhead costs almost always generated in top management, support and service departments, which are typically cost centres with no measurable outputs in financial terms (Smit, 1989, p. 218). This problem is accentuated at universities because of the magnitude of Overhead costs relative to total costs. Another reason is that academic management (heads of departments and deans of faculties) mostly have very limited management and financial knowledge; thus top management, including the departmental directors of support and service departments, act like line managers to the organisation, rather than delivering a service or support to academic departments and faculties (Smit, 1989, p. 218).

The global business environment is characterised by an increase in efficiency and shorter lifecycles of organisations directly related to improved and disrupted technology (Pathak and Palvia, 2021, pp. 36–37). The researcher is of the opinion that universities are at the crossroads of survival, losing their competitive advantage, based only on being face-to-face organisations closely located to students in a specific geographical environment. The inability to adapt quickly to the rapidly changing needs of students in terms of being taught skills that will ensure employability at affordable Tuition Fees in a new world of open-source and online learning is decreasing the historical competitive advantage of traditional universities in the world.

Even though automation, mechanisation and the changes in the external environment justify, in part, a relative rise in Overheads for businesses globally, this phenomenon could also be a result of insufficient management of especially discretionary Overheads. The literature reviewed in Chapter 2 confirms that Management and Cost accounting practices did not keep up with the changes in the cost structures of organisations and even possibly contributed to the escalation in Overhead costs (section 2.4.1.). However, Overhead costs might increase as a percentage of total costs in some service organisations, but technology should at least lower the Salary component of Overhead costs relative to inflation (as a result of efficiency caused by technology) and relative to Revenue growth (brought on by the fixed cost nature of Overheads and no direct causal relationship to outputs).

Within the disrupted environment universities are facing as detailed in Chapter 3 (section 3.5.), certain research questions are addressed in this chapter to assess whether South African universities are managed well from a financial perspective, meeting the criterium of increasing their efficiency from 2010 to 2019. The research questions addressed in this chapter are a) Did South African universities generate sufficient Revenue to cover their Expenses from 2010 up to 2019? b) Have the mix of government subsidies and Tuition Fees changed since 2010? c) Have the mix of academic and Overhead costs changed? and d) What has happened to the costs/Expenses of universities relative to inflation and growth in student numbers? These research questions are addressed using descriptive statistical analysis as well as inferential statistical analysis with the tested hypotheses stated in section 6.6.

Section 5.63. discussed the sample selected for this stage of the empirical portion of the study. The rest of this chapter will focus only on the 16 universities forming part of the sample, unless specifically stated otherwise.

6.1.2. Explanation of variables

The variables selected to use in the statistical analysis in this chapter are all, where applicable, classified as Council-controlled and Unrestricted in the Financial Statements of the related universities (refer to section 5.6.2.):

a. **Total Expenses** – This figure represents the total Actual Expenses for the related universities for 2019. Total Expenses are made up of Academic Salaries, Other Salaries and Other Expenses.
b. **Academic Salaries** – Academic Salaries are all Actual Expenses classified as Academic Salaries, as obtained from the Statement of Comprehensive Income of the sampled universities. Section 5.5.1.4. provides further detail on this figure.
c. **Other Salaries** – Represent Actual Salary-related costs for all personnel other than academic personnel, included in Academic Salaries specified above (b).
d. **Other Expenses** – Any Actual Expenses not included in Academic or Other Salaries were included in Other Expenses.
e. **Total Revenue** – Total Revenue refers to all the Actual Income received by a related university consisting of Tuition Fee Income, Subsidies and Grants, and Other Income.
f. **Tuition Fee Income** – All Actual Income received in the form of Tuition Fees from students enrolled at a university.
g. **Subsidies and Grants** – Subsidies and Grants refer to all actual government funding received by a university.
h. **Other Income** – All Actual Income received by a university not included in Tuition Fee Income or Subsidies and Grants.
i. **Budgeted (TIOU) benchmark** – The Budgeted variable based on the Nominal TIOU growth rate. This Budgeted benchmark served as a 100% Index to measure the actual growth of variables tested. This benchmark is calculated using either 100% TIOU growth or 50% (see section 6.3.1.).

The first statistical analysis performed focused on descriptive statistics. The descriptive statistics in this chapter start with an analysis of the composition of the line items of the Statement of Comprehensive Income for the sampled universities. After the analysis of the composition, the growth of these line items is analysed.

6.2. Analysing the Statement of Comprehensive Income 2010 to 2019

This section focuses on the average composition of Revenue and Expenses (costs) of the sampled universities for 2010, 2015 and 2019. Tables 6.1 and 6.3 illustrate the composition of both the Revenue streams and the different Expense categories from the Statement of Comprehensive Income, based on the averages of the sampled universities. In addressing the secondary objective to apply the principles of Management and Cost accounting to assess the efficiency with which the sampled South African universities, from a financial and historical perspective, were managed by analysing the Financial Statements for a sample of universities for 2010, 2015 and 2019, the following empirical aims were addressed a) to observe whether there was a change in the composition of Revenue streams and categories of Expenses, and b) whether the weighted average and mean yielded different results regarding the composition of Revenue streams and Expense categories.

Table 6.1: Sampled universities' average Statement of Comprehensive Income

	2010 R('000)	**2015 R('000)**	**2019 R('000)**
Revenue	**1,320,142**	**2,040,085**	**2,969,318**
Subsidies and Grants	689,117	923,924	1,494,854
Tuition Fee Income	415,691	766,287	1,030,383
Other Revenue	**215,335**	**349,873**	**444,081**
Investment Income	66,755	118,576	179,436
Other Income	128,915	182,905	205,422
Fair value adjustments/Revaluations/Realised gain on marketable securities	19,664	48,393	59,222
Expenses	**1,206,184**	**1,901,591**	**2,559,039**
Salaries	**739,168**	**1,149,564**	**1,592,532**
Academic Salaries	383,623	593,709	780,136
Other Salaries	355,545	555,855	812,396
Other Operating Expenses	467,016	752,027	966,508
Depreciation	48,671	82,733	113,308
Net surplus	**113,958**	**138,493**	**410,278**

Table 6.1 shows that both the Revenue and Expenses of universities increased from 2010 to 2019. From Table 6.1 can further be observed that the sampled universities had a noteworthy increase in Net surplus of 260% to R410.3 million (from R114 million in 2010). Depreciation was included in Other Operating Expenses, but was shown only to illustrate that it comprises less than 20% of Other Operating Expenses and is therefore not separately analysed. To truly observe what has happened with the sampled universities, Tables 6.2 and 6.3 show how the composition of Revenue and Expenses has changed from 2010 to 2019.

Table 6.2: Sampled universities' Revenue streams as a percentage of Total Revenue

	Weighted average			Mean		
	2010	**2015**	**2019**	**2010**	**2015**	**2019**
Revenue	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Subsidies and Grants	**52.2%**	**45.3%**	**50.3%**	**54.1%**	**47.9%**	**51.5%**
Tuition Fee Income	**31.5%**	**37.6%**	**34.7%**	**32.0%**	**37.4%**	**33.9%**
Other Revenue	**16.3%**	**17.1%**	**15.0%**	**13.9%**	**14.7%**	**14.6%**
Investment Income	5.1%	5.8%	6.0%	4.5%	5.3%	5.7%
Other Income	9.8%	9.0%	6.9%	8.3%	7.5%	5.6%
Fair value adjustments/Revaluations/ Realised gain on marketable securities	1.5%	2.4%	2.0%	1.0%	1.9%	3.3%

The weighted averages in Tables 6.2 to 6.4 were calculated taking the sum of all the Revenue streams and Expense categories for the sampled universities as a percentage of Total Revenue of the related universities, while the mean was calculated by averaging all the percentages for each category for all the sampled universities. The main reason for this differentiation is that the relative size and different growth rates in terms of number of enrolments and Expenses impacted the data. Although there are differences between the weighted average and the mean for the various Revenue streams, the researcher is satisfied these differences are small (the biggest difference was 2.6 percentage points for Subsidies and Grants in 2015), and that a few large universities in the sample did not distort the data. For all future tables (after Table 6.4) the researcher decided to use the weighted average for descriptive data, and the means for inferential analyses, since the mean is a statistical tool that is automatically applied in SPSS.

Table 6.2 indicates that Subsidies and Grants declined as a source of Revenue for South African universities from 2010 (52.2%) to 2015 (45.3%) but shows an improvement from 2015 to 2019 (50.3%). The decline up to 2015 can, in part, explain the increase in Tuition Fees, since government subsidies declined as a percentage of Revenue from 2010 to 2015. Tuition Fees show an opposite trend (i.e. increasing) from 2010 to 2015 (31.5% to 37.6%), with a decline of 2.9 percentage points from 2015 to 2019 (37.6% to 34.7%), also explaining, in part, the #FeesMustFall protests in 2015. Two other deductions from Table 6.2 are also important, namely a) Tuition Fees as a percentage of Revenue still increased from 2010 (31.5%) to 2019 (34.7); and b) Other Revenue did not increase as a percentage of Revenue from 2010 (16.3%) to 2019 (15%). Tables 6.3 and 6.4 focus on the various Expense categories incurred at South African universities.

Table 6.3: Sampled universities' Expense categories as a percentage of Total Revenue

	Weighted average			Mean		
	2010	**2015**	**2019**	**2010**	**2015**	**2019**
Expenses	91.4%	93.2%	86.2%	91.7%	94.0%	85.7%
Salaries	**56.0%**	**56.3%**	**53.6%**	**57.2%**	**57.5%**	**53.6%**
Academic Salaries	**29.1%**	**29.1%**	**26.3%**	**29.8%**	**29.7%**	**26.6%**
Other Salaries	**26.9%**	**27.2%**	**27.4%**	**27.4%**	**27.7%**	**27.0%**
Other Expenses	**35.4%**	**36.9%**	**32.5%**	**34.5%**	**36.6%**	**32.1%**

Table 6.3 expresses Expense categories as a percentage of Revenue. A positive aspect is that Expenses as a percentage of Revenue declined from 91.4% in 2010 to 86.2% in 2019, indicating that the Net surplus as a percentage of Revenue, on average, increased. This increase suggests that South African universities were more profitable in 2019 than in 2010 and 2015. The question could, however, be asked whether a Net surplus of 13.8% is justified, as well as if this is the result of better management of Expenses or that the increases in Revenue were relatively higher than the increases in Expenses. Another observation is that Salaries decreased as a percentage of Revenue from 2010 (56%), but at 53.6% of Revenue in 2019, it still appears to be high (with Other Expenses only 32.5% of Revenue) and remains the highest Expense incurred at South African universities. Other Expenses also did not increase relative to Revenue from 2010 (35.4%) to 2019 (32.5%). What is, however, concerning is that Academic Salaries declined by 2.8 percentage points as a percentage of Revenue, while Other Salaries increased by 0.5 percentage points. There is no logical explanation for this trend, because universities should have

benefited from technology to improve the efficiency of top management, service and support departments. In Table 6.4, various categories of Expenses are calculated as a percentage of Total Expenses. The reason was to eliminate the effect of the increase in Net surplus (see Table 6.1).

Table 6.4: Sampled universities' Expense categories as a percentage of Total Expenses

	Weighted average			Mean		
	2010	**2015**	**2019**	**2010**	**2015**	**2019**
Expenses	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Salaries	**61.3%**	**60.5%**	**62.2%**	**62.5%**	**61.2%**	**62.6%**
Academic Salaries	**31.8%**	**31.2%**	**30.5%**	**32.6%**	**31.8%**	**31.2%**
Other Salaries	**29.5%**	**29.2%**	**31.7%**	**29.9%**	**29.4%**	**31.4%**
Other Expenses	**38.7%**	**39.5%**	**37.8%**	**37.5%**	**38.8%**	**37.4%**

Table 6.4 reflects a concerning picture. Although Salaries decreased as a percentage of Expenses from 2010 (61.3%) to 2015 (60.5%), it increased by 1.7 percentage points from 2015 to 2019 (62.2%). Another concern is that the increase was not in Academic Salaries, but Other Salaries, which increased by 2.5 percentage points from 2015 (29.2%) to 2019 (31.7%). This increase is investigated further in the following section.

6.3. Growth in Revenue and Expenses

The intention to focus on the increase or growth in Revenue and Expenses is to determine how the sampled universities improved their performance as measured by the increase in Net surplus from 2010 to 2019. It also creates the opportunity to measure efficiency. Both inflation and the growth in student enrolments (using TIUs and TOUs (TIOUs)) were considered. The inflation and TIOU growth were applied as a benchmark to calculate the Budgeted Revenue streams and Expense categories and finally used as an Index to evaluate the actual growth of the variables from 2010 to 2019.

6.3.1. Budgeted benchmark

The first step in calculating the Budgeted benchmark was to calculate the growth rate in the TIUs and TOUs for each individual university from 2010 to 2019 (TIOU). This growth rate was adjusted for inflation (Infl) to calculate the nominal growth rate as illustrated in Equation 6.1:

Equation 6.1: Nominal TIOU growth rate

$$\text{Nominal TIOU growth rate} = ((1+\text{TIOU})\ \text{x}\ (1+\text{Infl})) - 1$$

The Nominal TIOU growth rate as calculated in Equation 6.1 for each sampled university was used as a Budgeted benchmark. This Nominal TIOU growth rate is not an existing, acknowledged standard rate; it is a rate specifically calculated for the purpose of this study. Any reference in this study to Nominal TIOU growth rate refers exclusively to the rate calculated for this study by applying Equation 6.1. The reason for applying this equation was because both inflation and the growth in TIUOs influence the Revenue streams and the Expense categories of the sampled universities. The intention was thus to eliminate both these factors to determine if the actual Revenues and Expenses increased above the Budgeted values. If they did, it could be an indication of inefficiency. The Budgeted benchmark was applied by calculating the actual growth rate for each individual university's relevant variables from 2010 to 2019. This growth rate was then divided by the Nominal TIOU growth rate as calculated by applying Equation 6.1 to get to the actual inflation and growth-adjusted increase for the related variables for each individual university, as indicated by Equation 6.2:

Equation 6.2: Actual inflation and growth-adjusted increase in variables

$$Indexed\ growth\ = (1 +\ Actual\ growth\ 2010\ to\ 2019)/(1 + Nominal\ TIOU\ growth\ rate)$$

The actual growth for the variables considered is expressed in terms of the Index when applying Equation 6.2. The effect is that if the variable grew in line with inflation and TIOU growth, the Indexed growth will be 100%. If the Indexed growth rate is more than 100%, the actual variable increased more than the Budgeted benchmark. If the Indexed growth is less than 100%, the actual variable growth was less than the Budgeted benchmark.

When the Indexed growth of the actual variables were calculated, two possible scenarios were considered. Either 100% of the growth in TIUs and TOUs were used or 50%. In section 5.6.2.4. the two growth assumptions considered in the statistical analysis were discussed in detail. What is, however, important to keep in mind is that it is unlikely that expenditure will grow in line with 100% of the growth in enrolments, making the 50% assumption more realistic, but also more conservative from the perspective of the universities, since most costs incurred at a university are fixed, as explained in section 4.5.

If Revenue increased more than the Nominal TIOU growth, it is indicative of either Subsidies and Grants or Tuition Fee Income driving the improvement in the Net surplus, since Table 6.2 has already established that Other Income did not necessarily contribute to the improvement of the Net surplus of the sampled universities. When considering whether Net surplus improved because of efficiency, the measurement of what has happened to Expenses should be considered. The expectation regarding Expenses is, because of technology and the fact that most Expenses of a university are fixed (specifically Overhead costs), South African universities should have increased Expenses less than the combination of inflation and growth in TIOUs. This is due to the lack of an input-output relationship in most of the Expense categories at universities with a growth in enrolments. Only Academic Salaries have a direct input-output relationship to the growth in enrolments, but when considering Economies of Scale, even Academic Salaries in an environment of growth in enrolments should have increased less than inflation and growth in TIOUs. Tables 6.5 and 6.6 illustrate the increase in Revenue and Expenses of the sampled South African universities relative to inflation.

Table 6.5: The Nominal growth in Revenue for the sampled universities from 2010 to 2019 compared to inflation

				Per annum		
	2010-15	**2015-19**	**2010-19**	**2010-15**	**2015-19**	**2010-19**
Revenue	**54.5%**	**45.5%**	**124.9%**	**9.10%**	**9.84%**	**9.42%**
Subsidies and Grants	34.1%	61.8%	116.9%	6.04%	12.78%	8.99%
Tuition Fee Income	84.3%	34.5%	147.9%	13.01%	7.68%	10.61%
Other Revenue	62.5%	26.9%	106.2%	10.19%	6.14%	8.37%
Inflation	31.2%	21.5%	59.4%	5.58%	4.99%	5.32%

The inflation figures in Tables 6.5 to 6.7 are based on the All items, Total Country Consumer Price Index (CPI) (Editorial, 2020b). Deduced from Table 6.5 is that the Revenue of South African universities' actual increase was 124.9%, more than double the inflation rate of 59.4%, from 2010 to 2019. Comparing the annual increase in Revenue of South African universities at 9.42% to the average inflation of 5.32%, only an increase in enrolments could justify this phenomenon. If not, the increase in Tuition Fee Income at 13.0% per annum from 2010 to 2015, substantially above the annual inflation rate, could explain the increase in Revenue. Universities often blame the increase in Tuition Fees on the decline in Government Subsidies and Grants, but Subsidies and Grants also increased above the inflation rate. In Table 6.6, the same assessment for Expenses was done.

Table 6.6: The Nominal growth in Expenses for the sampled universities from 2010 to 2019 compared to inflation

				Per annum		
	2010-15	**2015-19**	**2010-19**	**2010-15**	**2015-19**	**2010-19**
Expenses	**57.7%**	**34.6%**	**112.2%**	**9.53%**	**7.71%**	**8.72%**
Salaries	55.5%	38.5%	115.4%	9.23%	8.49%	8.90%
Academic Salaries	54.8%	31.4%	103.4%	9.13%	7.07%	8.21%
Other Salaries	56.3%	46.2%	128.5%	9.35%	9.95%	9.62%
Other Operating Expenses	61.0%	28.5%	107.0%	10.00%	6.47%	8.42%
Inflation	31.2%	21.5%	59.4%	5.58%	4.99%	5.32%

From the results in Table 6.6, the sampled universities did not manage their Expenses efficiently. Total Expenses showed an actual growth rate of 112.2% from 2010 to 2019, almost double the inflation experienced over that period of 59.4%. What is concerning is the fact that Salaries increased the most (115.4%) compared to Other Operating Expenses of 107% from 2010 to 2019 and, more specifically, Other Salaries. Other Salaries increased from 2010 to 2019 with 128.5%, more than double the inflation rate. This growth amounts to a 9.62% annual growth. In a world of technology and automation, combined with the fact that Other Salaries are indirect with almost no causal relationship to an increase in enrolments, this trend seems problematic from a Management and Cost accounting perspective. To provide more context to the analysis of the financial data, it was necessary to take student enrolments (TIOUs) into account, as indicated in Table 6.7.

Table 6.7: The growth in TIOUs from 2010 to 2019 at the sampled universities

	2010	**2015**	**2019**			
TIOUs (units)	**886,556**	**1,017,734**	**1,179,501**	**Per annum**		
	2010-15	**2015-19**	**2010-19**	**2010-15**	**2015-19**	**2010-19**
Inflation	31.18%	21.52%	59.41%	**5.58%**	**4.99%**	**5.32%**
Growth in TIOUs	14.80%	15.89%	33.04%	**2.80%**	**3.76%**	**3.22%**
Inflation+100% (Growth in TIOUs)	50.59%	40.84%	112.08%	**8.53%**	**8.94%**	**8.71%**

Inflation+50% (Growth in TIOUs)	40.88%	31.18%	85.75%	**7.10%**	**7.02%**	**7.12%**

The growth calculated in Table 6.7 is based on TIUs and TOUs. The researcher is of the opinion that TIUs and TOUs are the two most relevant measures of the increase in enrolments, since Table 6.2 indicates that Subsidies and Grants from the government are the biggest source of Revenue at South African universities. TIUs, TOUs and ROUs are the three measures of Subsidy and Grants Revenue as used in the analysis of financial information in the empirical portion of this study. Data are available for all 26 publicly funded South African universities in terms of student enrolments (TIUs and TOUs), the number of graduates and ROUs. ROUs in Rand value contribute less than 10% to total Subsidies and Grants and were thus excluded because it makes such a small difference. Student enrolments and number of graduates do not take CESM levels (see section 4.5.5.1.) or funding levels into account and is therefore a less accurate measure of enrolment growth at South African universities; hence only TIUs and TOUs were used.

A further consideration is the fact that TIUs and TOUs (as indicated in the Subsidies and Grants figure in Table 6.2) represent more than 80% of the unrestricted, Council-controlled Revenue of South African universities. In Table 6.7 it is indicated that the sampled South African universities grew in terms of TIOUs with 33% in size from 2010 to 2019. Given the fixed nature of the costs incurred at universities, the Expenses of universities should show a smaller increase relevant to the growth in enrolments to ensure universities benefit from Economies of Scale and efficiency (see section 4.5.4).

To evaluate whether universities benefited from Economies of Scale and improved efficiency, the last row of Table 6.7 is an indication of inflation plus 50% of the growth in enrolments as a percentage. **This calculation is based on a conservative assumption that Expenses should only grow at inflation plus a rate of 50% of enrolment growth.** This assumption would be especially true for Other Salaries, which could be regarded as the only Overhead cost of universities (Other Expenses also contain Overhead costs, but the researcher could not find any distinction between the portion of Other Expenses that went directly to the academic departments and faculties versus what were typical running costs of the universities). Tables 6.8. to 6.11 will provide more clarity on the evaluated efficiency of the sampled South African universities. TIUs and TOUs for each individual university included in the sample were used to calculate the mean growth in TIUs and TOUs per university plus the average inflation, not using the mean increase for all the universities combined.

Table 6.8: Revenue growth adjusted with Inflation + 100% (TIOU growth)

	Mean: Actual Revenue growth			Per annum		
	2010-15	2015-19	2010-19	2010-15	2015-19	2010-19
Revenue	**2.62%**	**3.35%**	**6.05%**	**0.52%**	**0.83%**	**0.66%**
Subsidies and Grants	-10.97%	14.88%	2.28%	-2.30%	3.53%	0.25%
Tuition Fee Income	22.41%	-4.52%	16.87%	4.13%	-1.15%	1.75%
Other Revenue	7.90%	-9.88%	-2.76%	1.53%	-2.57%	-0.31%

The purpose of Table 6.8 was to determine the measure in which the Revenue streams of South African universities increased or decreased after adjusting for inflation and growth in TIOUs from 2010 to 2019. If the percentage in Table 6.8 is negative, it implies that universities received less Revenue per student enrolment (normalised using TIUs and TOUs) and vice versa. The Total Revenue of universities increased more than inflation and TIOU growth for both 2010–2015 (2.62%) and 2015–2019 (3.35%). Focusing on the different Revenue streams, Government Subsidies and Grants showed a negative growth of 10.97% for the period 2010 to 2015 (-2.30% per annum), indicating that South African universities were subsidised less for this period. This negative growth rate also explains, in part, the reason why these universities had to adjust Tuition Fees if no savings in Expenses had been realised for the period 2010 to 2015. However, Subsidies and Grants increased more than adequately (14.88%) from 2015 to 2019 to leave a relative increase for the whole period of 2.28%. This implies that there is no excuse for universities to claim that they had to keep on increasing Tuition Fees above inflation and growth in TIOU for the period 2010 to 2019.

The increase in Tuition Fees is reflected in the increase of 22.41% (4.13% p.a. above inflation and 100% growth in TIOUs) in Tuition Fee Income from 2010 to 2015, as reflected in Table 6.8. The importance of these results cannot be overemphasized. From Table 6.8 it is observed that South African universities overcompensated for the decline in Government Subsidies and Grants per enrolment by increasing their Tuition Fees at a rate of almost double the decrease in Subsidies and Grants. Two critical deductions can be made, namely a) South African universities did not attempt to improve their efficiency by cutting costs – they increased Tuition Fees substantially above inflation, and b) students were facing a real crisis; hence the #FeesMustFall outcry was justified. If *affordable education* should be one of the critical strategic objectives of South African universities, it appears universities missed achieving this objective in the period 2010 to 2015.

Focusing on Other Revenue, it increased more than inflation and TIOU growth for the first period (2010-2015), but below inflation and TIOU growth for the last period (2015-2019). For the period 2010 to 2019 Other Revenue increased less than the nominal TIOU growth and, in this case, is a negative deduction. If Revenue at South African universities increased above inflation and growth in TIOUs because Other Revenue increased, it would imply universities were creative in generating Other Revenue, not just focusing on Government Subsidies and Grants and Tuition Fees for their survival. However, it did not happen, since Other Revenue grew less than inflation and TIOU growth (-2.76%) from 2010 to 2019, as is evident in Table 6.8. In Table 6.9, the financial implications in Rand of Table 6.8 are illustrated.

Table 6.9: Difference between Actual Revenue and Budgeted Revenue at 100% TIOU growth and inflation

	Mean per sampled university (R'000)			Total for sampled universities (R'000)		
	2015(10)	2019(15)	2019(10)	2015(10)	2019(15)	2019(10)
Revenue	**52,089**	**117,420**	**169,509**	**833,426**	**1,878,719**	**2,712,145**
Subsidies and Grants	-113,814	147,162	33,348	-1,821,023	2,354,585	533,562
Tuition Fee Income	140,301	8,469	148,771	2,244,820	135,511	2,380,331
Other Revenue	25,602	-38,211	-12,609	409,630	-611,378	-201,749

In Table 6.9 the Actual Revenue for 2010 was used as the basis year and then adjusted with the Nominal TIOU growth rate as presented in Table 6.7 to derive at a Budgeted Revenue benchmark for 2015 and 2019, respectively. The Difference between the Actual Revenue for 2015 and the Budgeted benchmark was then calculated. This difference was R52 million per sampled university in 2015. The same process was performed to determine the Budgeted benchmark for 2019 and the Difference between Actual and Budgeted Revenue for 2019 was calculated amounting to a mean per sampled university for Total Revenue of R170 million. The Difference between Budgeted and Actual Revenue for 2019 when 2015 actual results were used as the base year was then calculated by subtracting the calculated difference from

2015(10) from the difference for 2019(10). By quantifying the implications from Table 6.8, it can be deduced that the Revenue of the sample of South African universities increased by almost R170 million per university above inflation and TIOU growth. The biggest reason for this phenomenon is Tuition Fee increases. Tuition Fee increases amounted to R2 380 million above inflation and enrolment growth in 2019 for the sixteen sampled universities, **which clearly demonstrates that South African universities did not improve their efficiency by optimising their Expenses, but rather used increases in their Tuition Fees to improve their financial performance. This is also a violation of the fundamental strategic objective of universities to provide affordable higher education to South Africans.**

In Tables 6.10 to 6.17, similar calculations to those performed in Tables 6.8 to 6.9 were performed for the various Expense categories at the sampled universities. Two scenarios were created, namely if Expenses increased by inflation and 100% TIOU growth, versus if Expenses increased by inflation and 50% TIOU growth. Given the fixed nature of university Expenses and the large portion consisting of Overhead costs, the second scenario is much more appropriate (i.e. 50% TIOU growth). Growth in Expenses in line with inflation and 50% of TIOU growth would have been indicative that universities were efficient and benefited from Economies of Scale, considering that most costs incurred at universities are fixed. To further justify the 50% scenario, technology and automation should not have led to an increase in Other Salaries from 2010 to 2019 above inflation. In the absence of an input-output relationship, growth in TIOU units should not have caused an increase in Other Salaries. Accordingly, the worst-case scenario would be an increase in Expenses of inflation plus a 100% enrolment growth and the normal (conservative) case scenario would be an increase in Expenses of inflation and only 50% of enrolment growth. Table 6.10 presents how Expenses increased or decreased when inflation and 100% TIOU growth are taken out of the nominal growth.

Table 6.10: Expense growth adjusted with Inflation + 100% (TIOU growth)

	Real growth			Per annum		
	2010-15	**2015-19**	**2010-19**	**2010-15**	**2015-19**	**2010-19**
Expenses	**4.69%**	**-4.45%**	**0.04%**	**0.92%**	**-1.13%**	**0.00%**
Salaries	**3.28%**	**-1.63%**	**1.59%**	**0.65%**	**-0.41%**	**0.18%**
Academic Salaries	2.77%	-6.70%	-4.11%	0.55%	-1.72%	-0.47%
Other Personnel	**3.82%**	**3.78%**	**7.74%**	**0.75%**	**0.93%**	**0.83%**
Other Operating Expenses	6.93%	-8.74%	-2.42%	1.35%	-2.26%	-0.27%

Table 6.10 shows that Total Expenses grew faster than inflation and TIOU growth for the period 2010 to 2015 (4.69%), but there was an improvement for the period 2015 to 2019, with Expenses growing less (-4.45%) than inflation and 100% TIOU growth. A similar trend is observed for Salaries, but the total effect from 2010 to 2019 indicates that Salaries grew by 1.59% above the related Nominal TIOU growth. Over the nine years analysed, there was a saving in Other Operating Expenses of -2.42%. The real concern, however, is the relative decline in Academic Salaries of -4.11% from 2010 to 2019. Academic Salaries are the only Expenses at a university where there is a direct causal relationship with the number of student enrolments; yet Table 6.10 does not indicate this relationship. In contrast to Academic Salaries, Other Salaries increased by 7.74% above inflation and TIOU growth, which is an area of greater concern. As service organisations, universities are supposed to benefit from Economies of Scale, specifically where there is no direct causal relationship between inputs and outputs. In addition, technology and automation should have resulted in savings in terms of Other Salaries (typically Overhead costs), but this did not happen. The financial impact of the findings from Table 6.10 is illustrated in Tables 6.11 to 6.13.

Table 6.11: Weighted average Budgeted Rand value (R'000) if Expense categories grew in line with inflation and 100% TIOU growth from 2010 to 2015 for the sampled universities

	Actual	Actual	Budget	Budget – Actual	
	2010 R('000)	**2015 R('000)**	**2015 R('000)**	**2015 R('000)**	**% Of Budget**
Revenue	**1,320,142**	**2,040,085**	**2,040,085**	**0**	**0**
Expenses	**1,206,184**	**1,901,591**	**1,837,766**	**-63,826**	**-3.47%**
Salaries	**739,168**	**1,149,564**	**1,124,099**	**-25,465**	**-2.27%**
Academic Salaries	383,623	593,709	585,516	-8,193	-1.40%
Other Salaries	355,545	555,855	538,583	-17,272	-3.21%
Other Operating Expenses	467,016	752,027	713,667	-38,361	-5.38%
Net surplus	**113,958**	**138,493**	**202,319**	**63,826**	**31.55%**

Table 6.12: Weighted average Budgeted Rand value (R'000) if Expense categories grew in line with inflation and 100% TIOU growth from 2010 to 2019 for the sampled universities

	Actual	Actual	Budget	Budget - Actual	
	2010 R('000)	2019 R('000)	2019 R('000)	2019 R'000	% Of Budget
Revenue	**1,320,142**	**2,969,318**	**2,969,318**	**0**	**0**
Expenses	**1,206,184**	**2,559,039**	**2,588,811**	**29,772**	**1.15%**
Salaries	**739,168**	**1,592,532**	**1,583,799**	**-8,733**	**-0.55%**
Academic Salaries	383,623	780,136	827,793	47,657	5.76%
Other Salaries	355,545	812,396	756,006	-56,390	-7.46%
Other Operating Expenses	467,016	966,508	1,005,012	38,504	3.83%
Net Surplus	**113,958**	**410,278**	**380,507**	**-29,772**	**7.82%**

In Table 6.11 and 6.12, the inflation and 100% growth in TIOUs were applied to the actual Expense categories for 2010 to determine what each Expense category should have been per university included in the sample for 2015 (Budget) and 2019 (Budget). The results of the Difference between the Budgeted and Actual figures for 2015 and 2019 were then determined. Deduced from Table 6.11 is that actual Salaries in 2015 exceeded inflation and TIOU growth with R25.5 million per sampled universities, the majority of which is because of Other Salaries that exceeded inflation and TIOU growth by R17.3 million (-3.21%). The Difference between the Budgeted and Actual Other Salaries again proves the lack of efficiency universities applied in managing their Expenses, since Other Salaries consist primarily of Overhead costs, an area that should have benefited from increased efficiency because of technology and automation. This same lack of efficiency is seen in Other Operating Expenses, also consisting primarily of Overhead costs, where actual Expenses exceeded inflation and enrolment growth with R38.4 million. The result of the consistent overspending illustrated in Table 6.11 is that the actual Net surplus (excluding any change in Revenue) was less than Budgeted for 2015 by R63.8 million.

When moving to Table 6.12 and the results for 2019, the findings are even more concerning. In 2019, the actual Net surplus exceeded the Budgeted Net surplus by R29.8 million, indicating that universities seem to have managed their expenditure in 2019 more effectively; however, the primary reason for this seemingly improved efficiency is that less was spent on Academic Salaries than Budgeted. The positive Difference between Actual and Budgeted Academic Salaries of R47.7 million is indicative that universities underspent on Academic Salaries in 2019. This is concerning, since Academic Salaries is the only Expense category with a direct causal relationship with student enrolments. It seems that this underspending was utilised for Other Salaries where the actual Expense in 2019 was R56.4 million more than the Budgeted amount if this Expense grew in line with inflation and 100% TIOU growth. Given the fixed and indirect nature of Other Salaries, this is an unlikely assumption not taking efficiency or Economies of Scale into account. Table 6.13 summarises the findings regarding the Difference between Budgeted and Actual Expenses from Table 6.11 and 6.12.

Table 6.13: Summarised Differences between Budgeted and Actual results in Rand value if Expense categories grew in line with inflation and 100% TIOU growth from 2010 to 2019 for the sampled universities

	Budget – Actual (R'000)			**Budget – Actual as % of Budget**		
	2015(10)	**2019(15)**	**2019(10)**	**2015(10)**	**2019(15)**	**2019(10)**
Revenue	**0**	**0**	**0**	**0**	**0**	**0**
Expenses	**-63,826**	**93,597**	**29,772**	**-3.47%**	**3.62%**	**1.15%**
Salaries	**-25,465**	**16,732**	**-8,733**	**-2.27%**	**1.06%**	**-0.55%**
Academic Salaries	-8,193	55,850	47,657	-1.40%	6.75%	5.76%
Other Salaries	-17,272	-39,118	-56,390	-3.21%	-5.17%	-7.46%
Other Operating Expenses	-38,361	76,865	38,504	-5.38%	7.65%	3.83%
Net surplus	**63,826**	**-93,597**	**-29,772**	**31.55%**	**-24.60%**	**-7.82%**

What is important to note from Table 6.13 is that it only reflects the impact of the management of Expenses because the Revenue difference was excluded. Table 6.13 combines the results for the Differences between the Budgeted and Actual line items for three time periods considered, i.e. 2015 using Actual 2010 results as base, 2019 also using Actual 2010 results as base and 2019 using Actual 2015 results as base (calculated as the difference between the other two time periods). From Table 6.13, it appears as if universities managed their Expenses more efficiently from 2015 to 2019 with actual Net surplus of R93.6 million above the Budgeted Net surplus, resulting in an overall higher actual Net surplus of R29.8 million from 2010 to 2019. However, this apparently improved Net surplus is due to decreased spending on Academic Salaries of R47.7 million and increased spending on Other Salaries (Overhead cost) of R56.4 million. From the results in Table 6.13 universities seemingly did not manage their costs efficiently, decreasing spending, which should have a direct causal relationship with enrolments (Academic Salaries) and increasing Expenses that should be primarily fixed and which should have benefited from improved technology and automation (Overhead costs).

The results in Tables 6.10 to 6.13 were achieved using a highly unlikely scenario where all Expense categories are expected to grow in line with inflation and TIOUs. A still conservative, but more realistic scenario is that expenditure will grow in line with inflation and only 50% of the TIOU growth calculated in Table 6.7. Tables 6.14 to 6.17 provide a more realistic scenario where service organisations, like universities, should have benefited from technology and automation to achieve Economies of Scale due to the biggest portion of the costs incurred being fixed, not affected by a growth in enrolments.

Table 6.14: Expense growth adjusted with Inflation + 50% (Growth in TIOUs)

	Real growth			**Per annum**		
	2010-15	**2015-19**	**2010-19**	**2015-19**	**2010-15**	**2010-19**
Expenses	**11.90%**	**2.59%**	**14.22%**	**2.27%**	**0.64%**	**1.49%**
Salaries	**10.39%**	**5.61%**	**15.99%**	**2.00%**	**1.37%**	**1.66%**
Academic Salaries	9.85%	0.17%	9.48%	1.90%	0.04%	1.01%
Other Salaries	**10.97%**	**11.42%**	**23.01%**	**2.10%**	**2.74%**	**2.33%**
Other Operating Expenses	14.30%	-2.03%	11.42%	2.71%	-0.51%	1.21%

When applying a more realistic scenario where expenditure should grow at inflation plus 50% of TIOUs growth, Table 6.14 shows that Salaries grew at the highest rate above inflation and 50% of TIOU growth (15.99%). Expenses grew with 14.22% from 2010 to 2019, with most of the growth taking place from 2010 to 2015. Salaries grew at a faster rate than Total Expenses, with the biggest growth also taking place from 2010 to 2015. However, Other Salaries grew by 23.01% with the biggest growth, thus contrary to Total Expenses occurring from 2015 to 2019. This growth happened while Other Operating Expenses were decreasing (-2.03%). Table 6.14 illustrates the inefficient management of costs at universities from 2010 to 2019. Where most costs, due to their fixed nature, should have benefited from Economies of Scale and technological developments, the growth over and above inflation and 50% of TIOU growth proves the opposite. The impact of the growth in Expense categories is expressed in monetary terms in Tables 6.15 to 6.17 where the Budgeted and actual amounts for each Expense category based on inflation and 50% of TIOU growth are compared.

Table 6.15: Weighted average Budgeted Rand value (R'000) if Expense categories grew in line with inflation and 50% TIOU growth from 2010 to 2015 for the sampled universities

	Actual	Actual	Budget	Budget - Actual	
	2010 R('000)	2015 R('000)	2015 R('000)	2015 R'000	%
Revenue	**1,320,142**	**2,040,085**	**2,040,085**	**0**	**0**
Expenses	**1,206,184**	**1,901,591**	**1,710,018**	**-191,574**	**-11.20%**
Salaries	**739,168**	**1,149,564**	**1,046,869**	**-102,695**	**-9.81%**
Academic Salaries	383,623	593,709	544,376	-49,333	-9.06%
Other Salaries	355,545	555,855	502,493	-53,362	-10.62%
Other Operating Expenses	467,016	752,027	663,149	-88,878	-13.40%
Net Surplus	**113,958**	**138,493**	**330,067**	**191,574**	**58.04%**

Table 6.16: Weighted average Budgeted Rand value (R'000) if Expense categories grew in line with inflation and 50% TIOU growth from 2010 to 2019 for the sampled universities

	Actual	Actual	Budget	Budget - Actual	
	2015 R('000)	2019 R('000)	2019 R('000)	2019 R'000	%
Revenue	**1,320,142**	**2,969,318**	**2,969,318**	**0**	**0**
Expenses	**1,206,184**	**2,559,039**	**2,242,605**	**-316,435**	**-14.11%**
Salaries	**739,168**	**1,592,532**	**1,373,146**	**-219,386**	**-15.98%**
Academic Salaries	383,623	780,136	715,344	-64,792	-9.06%
Other Salaries	355,545	812,396	657,802	-154,593	-23.50%
Other Operating Expenses	467,016	966,508	869,459	-97,049	-11.16%
Net Surplus	**113,958**	**410,278**	**726,713**	**316,435**	**43.54%**

Table 6.17: Summarised Differences between Budgeted and Actual results in Rand value if Expense categories grew in line with inflation and 50% enrolment growth from 2010 to 2019 for the sampled universities

	Budget – Actual (R'000)			Budget-Actual as % of Budget		
	2015(10)	2019(15)	2019(10)	2015(10)	2019(15)	2019(10)
Revenue	**0**	**0**	**0**	**0**	**0**	**0**
Expenses	**-191,574**	**-124,861**	**-316,435**	**-11.20%**	**-5.57%**	**-14.11%**
Salaries	**-102,695**	**-116,691**	**-219,386**	**-9.81%**	**-8.50%**	**-15.98%**
Academic Salaries	-49,333	-15,459	-64,792	-9.06%	-2.16%	-9.06%
Other Salaries	-53,362	-101,232	-154,593	-10.62%	-15.39%	-23.50%
Other Operating Expenses	-88,878	-8,170	-97,049	-13.40%	-0.94%	-11.16%
Net Surplus	**191,574**	**124,861**	**316,435**	**58.04%**	**17.18%**	**43.54%**

The results presented in Tables 6.15 to 6.17 portray a more concerning picture than the results summarised in Table 6.13. When a more realistic growth rate is applied (50% TIOU growth), universities have become even less efficient than when 100% TIOU growth was considered in managing their Expenses. From Table 6.17

summarising the findings from Tables 6.15 and 6.16, it is evident that the actual Net surplus for universities was almost R317 million less than what it should have been in 2019. This is a 43.54% underperformance, compared to the Budgeted Net surplus. The main contributor is Other Salaries (-23.5%) and Other Operating Expenses (-11.16%), both consisting primarily of Overhead costs, with no direct causal relationship to student enrolments. Table 6.17 portrays an outcry that universities are failing in their management of Overhead costs, an Expense that should have decreased as technology advanced.

The next section will apply statistical tools to support the findings from Tables 6.1 to 6.17. The individual universities' performance was used to apply inferential statistics as detailed in the following section.

6.4. Inferential statistics

The first part of this chapter focused on descriptive statistics based on the amounts included in the Statement of Comprehensive Income of the sample universities. The second part of this chapter will test the hypotheses stated in section 6.6. derived from the findings of the descriptive statistics by applying inferential statistical tools.

The inferential statistics applied in this study focused on variables in two broad categories, i.e. Revenue and Expenses. The basis of the testing performed was to determine whether universities received Revenue and incurred Expenses in line with what is expected, taking inflation and the growth in TIOUs into account.

The first step towards applying inferential statistics to the variables stated was to test whether these variables were normally distributed. The extent and results of these tests are explained in the following section.

6.5. Normality tests

The assumption that the distribution of a variable is normal is paramount to the application of *t* tests (section 6.7.) and regression analysis (section 6.8.). For this reason, the variables listed in section 6.1.2. were tested to determine whether they were normally distributed by applying the Shapiro Wilk test in SPSS. The results of these tests are reported in Table 6.18. The hypotheses tested in this normality test, with a minimum significance level (α) of 0.05 for each variable, were as follows:

H_0: The data for the related variable are normally distributed.

H_a: The data for the related variable are not normally distributed.

Table 6.18: Results of Shapiro Wilk test for normality

Variable	Shapiro-Wilk			Accept/Reject H1o
	Statistic	df	Sig.	
TIOU growth	0.834	16	0.008**	Reject
Budgeted (TIOU) Benchmark (50%)	0.834	16	0.008**	Reject
Actual Total Revenue Growth/Index (100%)	0.929	16	0.232	Accept
Actual Subsidy Growth/Index (100%)	0.932	16	0.260	Accept
Actual Tuition Fee Income Growth/Index (100%)	0.919	16	0.160	Accept
Actual Total Expenses Growth/Index (100%)	0.914	16	0.135	Accept
Actual Academic Salaries Growth/Index (100%)	0.727	16	0.000**	Reject
Actual Other Salaries Growth/Index (100%)	0.908	16	0.110	Accept
Actual Other Expenses Growth/Index (100%)	0.897	16	0.073	Accept
Actual Total Expenses Growth/Index (50%)	0.981	16	0.971	Accept
Actual Academic Salaries Growth/Index (50%)	0.775	16	0.001**	Reject
Actual Other Salaries Growth/Index (50%)	0.930	16	0.247	Accept
Actual Other Expenses Growth/Index (50%)	0.814	16	0.004**	Reject

***Significant at <1%; *Significant at <5%*

As seen from Table 6.18, five variables initially produced a significance lower than 0.05 indicating that the H_0 hypothesis must be rejected, and that the data represented by these variables were not normally distributed. These five variables were therefore adjusted to Natural Logs (NL), and the NL tested using the Shapiro Wilk test for normality. Table 6.19 contains the result of the normality test for the variables not normally distributed in Table 6.18, with the same hypotheses and significance level as applicable to Table 6.18.

Table 6.19: Shapiro Wilk test for normality using NL

Variable	Shapiro-Wilk			Accept/Reject H1o
	Statistic	df	Sig.	
NL TIOU growth	0.946	16	0.433	Accept
NL Adjusted TIOU at 50%	0.928	16	0.227	Accept
NL Actual Academic Salaries Growth/Index (100%)	0.929	16	0.235	Accept
NL Actual Academic Salaries Growth/Index (50%)	0.885	16	0.046*	Reject
NL Actual Other Expenses Growth/Index (50%)	0.887	16	0.050	Accept

***Significant at <1%; *Significant at <5%*

The results reported in Table 6.19 show that the use of NL ensured the normal distribution of all variables except for the NL of Actual Academic Salaries growth at 50%, which represents the Academic Salary growth adjusted for Inflation and 50% of the TIUs and TOUs growth from 2010 to 2019. This means the H_0 for this variable is still rejected, even with the use of NL. The reason for this rejection of the H_0 is an outlier from one university. This outlier was taken out and the Shapiro Wilk test was applied again with the results as depicted in Table 6.20.

Table 6.20: Shapiro Wilk Test for normality of Academic Salaries taking the outlier out

Variable	Shapiro-Wilk			Accept/Reject H1o
	Statistic	df	Sig.	
NL Actual Academic Salaries Growth/Index (50%)	0.932	15	0.296	Accept
Actual Academic Salaries Growth/Index (50%)	0.967	15	0.818	Accept

***Significant at <1%; *Significant at <5%*

Table 6.20 shows that for both Academic Salaries in relation to 50% of the growth and inflation Index as well as the NL of that variable, the data distribution is normal when the one outlier is removed. Due to the small population and resulting sample available in this study, the outlier has a major impact on significance, but does not impact the findings from this study in a measure that it cannot be relied upon, and the outlier was therefore still included in the sample for the related variable.

6.6. Hypotheses tested

The variables in section 6.1.2. were used to test certain hypotheses. These hypotheses were tested by applying inferential statistics using SPSS. The hypotheses tested in the rest of this chapter are as follows:

$H1_0$: The mean Actual Revenue is not significantly ≤ the mean Budgeted Revenue *at 100% TIOU growth*.
$H1_a$: The mean Actual Revenue is significantly > the mean Budgeted Revenue *at 100% TIOU growth*.

$H2_0$: The mean Actual Tuition Fee Income is not significantly ≤ the mean Budgeted Tuition Fee Income *100% TIOU growth*.

$H2_a$: The mean Actual Tuition Fee Income is significantly > the mean Budgeted Tuition Fee Income *at 100% TIOU growth*.

$H3_0$: *The mean Actual Subsidies and Grants are not significantly* ≤ the mean Budgeted Subsidies and Grants *at 100% TIOU growth*.
$H3_a$: The mean Actual Subsidies and Grants are significantly > the mean Budgeted Subsidies and Grants *at 100% TIOU growth*.

$H4_0$: The mean Actual Expenses are not significantly ≤ the mean Budgeted Expenses at 100% TIOU growth.
$H4_a$: The mean Actual Expenses are significantly > than the mean Budgeted Expenses at 100% TIOU growth.

$H5_0$: The mean Actual Expenses are not significantly ≤ the mean Budgeted Expenses at 50% TIOU growth.
$H5_a$: The mean Actual Expenses are significantly > the mean Budgeted Expenses at 50% TIOU growth.

$H6_0$: The mean Actual Academic salaries are not significantly ≤ the mean Budgeted Academic salaries at 50% TIOU growth.
$H6_a$: The mean Actual Academic salaries are significantly > the mean Budgeted Academic salaries at 50% TIOU growth.

$H7_0$: The mean Actual Other salaries are not significantly ≤ the mean Budgeted Other salaries at 50% of TIOU growth.
$H7_a$: The mean Actual Other salaries are significantly > than the mean Budgeted Other salaries at 50% of TIOU growth.

$H8_0$: The mean Actual Other expenses are not significantly ≤ the mean Budgeted Other expenses at 50% of TIOU growth.
$H8_a$: The mean Actual Other expenses are significantly > the mean Budgeted Other expenses at 50% of TIOU growth.

$H9_0$: There exists no significant relationship between the growth rate in TIOUs (enrolments) and the mean Budgeted less Actual Total Expenses.

$H9_a$: There exists a significant relationship between the growth rate in TIOUs (enrolments) and the mean Budgeted less Actual Total Expenses.

$H10_0$: There exists no significant relationship between the growth rate in TIOUs (enrolments) and the mean Actual less Budgeted Total Revenue.
$H10_a$: There exists a significant relationship between the growth rate in TIOUs (enrolments) and the mean Actual less Budgeted Total Revenue.

$H11_0$: There exists no significant relationship between Budgeted less Actual Total Expenses and Actual less Budgeted Total Revenue.
$H11_a$: There exists a significant relationship between Budgeted less Actual Total Expenses and Actual less Budgeted Total Revenue.

When considering the testing of the hypotheses in this study, a *p*-level of less than 0.05 ($p < .05$) is acceptable and seen as strongly significant, and will lead to a rejection of the null hypothesis following a one-tailed test. A *p*-level more than 0.05 ($p > .05$) will cause the alternative hypothesis to be rejected (refer to section 5.6.5.3.1.2.) The results of the testing of the above hypotheses are stated in the sections to follow in this chapter.

6.7. Hypothesis testing

This section reports the results of applying inferential statistical tools to test the stated hypotheses. The section is divided into three main subsections. The first subsection discusses the Indexed Budgeted benchmark that was used in the hypothesis testing. The next subsection focuses on the testing of the hypotheses related to Revenue and the third subsection focuses on the hypotheses related to Expenses. The final focus of this chapter is on the impact of growth in TIOUs universities experienced from 2010 to 2019 on Revenue and Expenses.

The statistical tools applied were one sample *t* tests, compare means, Pearson's correlation coefficient, as well as regression analysis. The one sample *t* test is performed using parametric data from a *t* distribution that is similar to a normal distribution, tested in section 6.5 (Malhotra *et al.*, 2017, p. 582).

6.7.1. Indexed Budgeted (TIOU) benchmark

The hypotheses stated in section 6.6. aims to determine whether Actual Revenue and Expenses of the sampled universities deviated from the Indexed Budgeted (TIOU) benchmark. This was determined by performing one sample *t* tests. These *t* tests focus on the growth of the selected variables from 2010 to 2019. This growth was expressed using the Nominal TIOU growth rate (Equation 6.1) as an Indexed benchmark of the Budget as explained in section 6.3.1. Tables 6.21 and 6.22 illustrate this Index by applying a *t* test to determine the statistical significance of using the Budgeted benchmark as an Index at 100%.

Table 6.21: Budgeted TIOU Benchmark as an Index of 100%

	N	Mean	Std. Deviation	Std. Error Mean
Budgeted (TIOU) Benchmark	16	100.00%	19.45%	4.86%

Table 6.22: Budgeted TIOU Benchmark *t* test

	Test Value = 100				
	T	Df	Significance One-Sided p	95% Confidence Interval	
				Lower	Upper
Budgeted (TIOU) Benchmark	0.000	15	0.500	-10.36%	10.36%

***Significant at <1%; *Significant at <5%*

In Tables 6.21 and 6.22 each university in the sample's Nominal TIOU growth rate from 2010 to 2019 was Indexed in proportion to the average growth of all sampled universities (section 6.3.1.). This Index was used in the rest of this chapter to indicate the measure in which the actual growth of a variable deviated from the expected growth, referred to as the Indexed growth. This Index is 100% since, as seen in Table 6.21, the Budgeted (TIOU) benchmark had a mean of 100%. When a *t* test is performed on this Index, the *p* value of 0.5 in Table 6.22 indicates that there is no statistically significant difference between the Budgeted (TIOU) benchmark and 100% (the Budgeted benchmark is therefore 100%; any deviation from 100% indicates a deviation from the Budget). This 100% distribution of growth will henceforth be used as an Index for all variables investigated in this section.

6.7.2. Revenue-related hypothesis testing

Universities received Revenue from three main streams for the purpose of this study, i.e. Tuition Fee Income, Subsidies and Grants and Other Income. This section will only focus on Subsidies and Grants and Tuition Fee Income, since Other Income contributed an average of 15.0% to the Total Revenue of the sampled universities, as indicated in Table 6.2, as opposed to the Subsidies and Grants' contribution of 50.3% and Tuition Fee Income of 34.7%. Other Income represents a small contribution to Revenue, with a skewed distribution (large differences amongst universities regarding Other Income) and was therefore excluded from the inferential statistical testing performed in this section.

The first *t* test applied for Revenue-related hypotheses was to test whether there exists a significant Difference between the Actual and Budgeted Revenue of universities. The difference in Revenue was further explored by considering the difference in Subsidies and Grants as well as Tuition Fee Income. The tested hypotheses are as follows:

$H1_0$: The mean Actual Revenue is not significantly ≤ the mean Budgeted Revenue *at 100% TIOU growth*.
$H1_a$: The mean Actual Revenue is significantly > the mean Budgeted Revenue *at 100% TIOU growth*.

$H2_0$: The mean Actual Tuition Fee Income is not significantly ≤ the mean Budgeted Tuition Fee Income *100% TIOU growth*.
$H2_a$: The mean Actual Tuition Fee Income is significantly > the mean Budgeted Tuition Fee Income *at 100% TIOU growth*.

$H3_0$: *The mean Actual Subsidies and Grants are not significantly* ≤ the mean Budgeted Subsidies and Grants *at 100% TIOU growth*.
$H3_a$: The mean Actual Subsidies and Grants are significantly > the mean Budgeted Subsidies and Grants *at 100% TIOU growth*.

The results of the testing of the stated hypotheses are reported in Tables 6.23 and 6.24. For the testing of H1 to H3, one sample *t* tests were used. In these *t* tests, the actual mean growth for the Revenue streams from 2010 to 2019, expressed in terms of the Index discussed in section 6.7.1., was compared with the test value set at 100%, which is equal to the calculated mean Indexed Budgeted (TIOU) benchmark (Index).

Table 6.23: Actual versus Budgeted Income at 100% TIOU growth (H1 to H3)

	N	Mean	Std. Deviation	Std. Error Mean
Actual Total Revenue Growth/Index (100%) H1	16	109.24%	19.18%	4.79%
Actual Tuition Fee Income Growth/Index (100%) H2	16	116.12%	25.37%	6.34%
Actual Subsidies and Grants Growth/Index (100%) H3	16	102.93%	12.40%	3.10%

Table 6.24: Revenue: One sample *t* test (H1 to H3)

	Test Value = 100				
	T	df	Significance	95% Confidence Interval	
			One-Sided p	Lower	Upper
Actual Total Revenue Growth/Index (100%) H1	1.928	15	0.036*	-0.97%	19.46%
Actual Tuition Fee Income Growth/Index (100%) H2	2.542	15	0.011*	2.60%	29.64%
Actual Subsidies and Grants Growth/Index (100%) H3	0.946	15	0.180	-3.67%	9.54%

***Significant at <1%; *Significant at <5%*

Reported in Table 6.23 is that universities received 9.24% more Revenue than what was expected if their Revenue grew in line with the Index from 2010 to 2019. This 9.24% difference, as indicated in Table 6.24, was significant (p = .036). The $H1_0$ hypothesis was therefore rejected, indicating that the mean Actual Revenue is significantly more than the Budgeted Revenue at 100% TIOU growth.

Tables 6.23 and 6.24 also contain the results of investigating the cause of the significant Difference between the Actual and Budgeted Revenue. Table 6.23 shows that Tuition Fee Income grew with 16.12% more than the Indexed Tuition Fee Income, an increase that is significant (p = .011). The findings reported in Tables 6.23 and 6.24, indicate that Subsidies and Grants only grew with 2.93% more than the Index, a difference that is not significant, even when considered at a .1 p level. The results of these two t tests and the significance of the Difference between Actual and Budgeted Tuition Fee Income implies that $H2_0$ was rejected, and that the mean Actual Tuition Fee Income is significantly more than the mean Budgeted Tuition Fee Income. In contrast, the alternative hypothesis $H3_a$ was rejected and Actual Subsidies and Grants were therefore not significantly more than the Budgeted Subsidies and Grants. The results in Tables 6.23 and 6.24 also indicate that the growth in Revenue is primarily because of Tuition Fee increases above inflation and TIOU growth. These Tuition Fee increases were also not justified by a decrease in Subsidies and Grants, since Subsidies and Grants increased in line with the growth in TIOUs with an insignificant difference from the expected Budgeted amount. The next section explores the testing of the significance of the Difference between Actual and Budgeted Expenses.

6.7.3. Expense-related hypothesis testing

Similar to the Revenue of universities, the Total Expenses incurred at universities for the purpose of this study were classified into three categories, i.e. Academic Salaries, Other Salaries and Other Expenses. The significance of the Difference between the Actual mean of each Expense category and the mean Budgeted category was compared in this section to test H4 to H8. The first hypothesis tested was:

$H4_0$: The mean Actual Expenses are not significantly ≤ the mean Budgeted Expenses at 100% TIOU growth.
$H4_a$: The mean Actual Expenses are significantly > than the mean Budgeted Expenses at 100% TIOU growth.
A one-sample *t* test was used to test whether the mean Actual Total Expenses differed significantly from the mean Budgeted Total Expenses by expressing the growth in total Actual Expenses from 2010 to 2019 in proportion to the Indexed growth. For this test, the Indexed growth as explained in section 6.7.1. was determined by taking 100% of the TIOUs into account. The results of the related *t* tests are provided in Tables 6.25 and 6.26.

Table 6.25: Actual versus Budgeted Expenses at 100% TIOU growth (H4)

	N	Mean	Std. Deviation	Std. Error Mean
Actual Total Expenses Growth/Index (100%) H4	16	101.18%	11.86%	2.97%
Actual Academic Salaries Growth/Index (100%)	16	99.47%	30.26%	7.56%
Actual Other Salaries Growth/Index (100%)	16	107.39%	15.34%	3.84%
Actual Other Expenses Growth/Index (100%)	16	102.22%	18.09%	4.52%

Table 6.26: Expenses (100%): One sample *t* test (H4)

	Test Value = 100				
	t	df	Significance	95% Confidence Interval	
			One-Sided *p*	Lower	Upper
Actual Total Expenses Growth/Index (100%) H4	0.398	15	0.348	-5.14%	7.50%
Actual Academic Salaries Growth/Index (100%)	-0.070	15	0.472	-16.65%	15.59%
Actual Other Salaries Growth/Index (100%)	1.926	15	0.037*	-0.79%	15.56%
Actual Other Expenses Growth/Index (100%)	0.491	15	0.315	-7.42%	11.86%

**Significant at <1%; *Significant at <5%*

When comparing the mean Actual Growth in the different Expense categories as stated in Table 6.25, it seems that the biggest contributor to the growth in Expenses above the stated Index was Other Salaries (mean growth 7.39% more than the Index). Comparing the Indexed means in Table 6.26 of the various Expenses categories using a one sample *t* test, the only significant difference from the Indexed growth (Budget) is the growth in Other Salaries (p = .037). All other Expense categories' growth, including Total Expenses were insignificant. The findings from Table 6.26 imply that $H4_0$ is not rejected and that the mean Actual Total Expenses do not differ significantly from the mean Budgeted Total Expenses at 100% TIOU growth. However, the Actual Other Salaries were significantly more than the Budgeted Other Salaries at 100% TIOU growth. As mentioned before, no hypotheses were formulated for Academic and Other Salaries, or Other Expenses at 100% TIOU growth, because the author is of the opinion that, given that universities are regarded as service organisations with predominantly fixed costs, these costs/Expenses should not have increased above inflation and 100% TIOUs.

From the means stated in Table 6.25, Total Actual Expense growth was only 1.18% more than the Indexed Budget. This seems like a small difference; however, when the performance of the individual universities is considered, this difference appears much more concerning due to the distribution of the differences for the individual universities as presented in Table 6.27. The small percentage differences between Tables 6.27 to 6.30 versus the other tables with inferential statistics are related to the Weighted Mean (descriptive tables) versus the Mean (inferential) (see section 5.6.2.3.).

Table 6.27: Expense difference at 100% of TIOU growth for individual universities

University	Expenses		Difference	Difference
	Actual2019 R('000)	Budget2019 R('000)	Budget-Actual R('000)	As % of Budget R('000)
Univ2	4,771,101	4,415,874	-355,227	-8.0%
Univ9	2,228,014	1,997,542	-230,472	-11.5%
Univ12	1,528,576	1,302,973	-225,603	-17.3%
Univ5	1,691,025	1,518,442	-172,583	-11.4%
Univ4	3,574,561	3,439,725	-134,836	-3.9%
Univ3	2,146,764	2,037,485	-109,279	-5.4%
Univ1	2,412,399	2,319,536	-92,863	-4.0%

University	Expenses		Difference	Difference
	Actual2019 R('000)	Budget2019 R('000)	Budget-Actual R('000)	As % of Budget R('000)
Univ11	826,076	733,232	-92,844	-12.7%
UoT3	759,348	678,018	-81,330	-12.0%
UoT2	2,009,597	1,935,060	-74,537	-3.9%
Univ10	3,750,707	3,878,585	127,878	3.3%
UoT1	3,895,947	4,171,280	275,333	6.6%
Univ8	1,216,545	1,532,675	316,130	20.6%
Univ7	4,824,688	5,188,567	363,879	7.0%
UoT4	1,568,565	1,981,497	412,932	20.8%
Univ6	3,740,717	4,290,488	549,771	12.8%
Weighted mean	**2,559,039**	**2,588,811**	**29,772**	**1.2%**
Total	**40,944,630**	**41,420,977**	**476,347**	**1.2%**

From Table 6.27, the Difference between Budgeted and Actual Expenses for a Budget based on 100% of TIOU growth using the weighted mean (Total Budgeted Expenses – Total Actual Expenses) is R29.8 million. When this difference is expressed in proportion to the Total Budgeted Expenses it amounts to 1.2%. However, this difference ranges from a negative R355 million for Univ2 to a positive R550 million for Univ6. Interpreting these differences implies that Univ2 spent R355 million more than the Budgeted Expenses in 2019, whilst Univ6 spent R550 million less than the Budgeted Expenses in 2019, based on 100% TIOU growth. Of the 16 sampled universities, ten universities spent more than their Expense Budgets. The amount that the ten of the 16 sampled universities overspent was R1 569.6 million, or -7.7% of their 2019 Budgeted Expenses.

This wide range of differences illustrate that the deviation of the related universities' spending from their Budgets is not because of a common, external factor, but due to the individual universities' own internal efficiency (or inefficiency) with which they managed their Expenses. For example, if the price of fuel increases substantially, all transport companies will experience similar increases in Expenses. In the case of the sampled universities, the Expense differentiation from the Budget ranged from minus 17.3% to positive 20.8%, illustrating the inefficiency and inconsistency with which Expenses at some universities were managed. The same issue is confirmed in Table 6.28. Table 6.27 contains the Differences between Budgeted and Actual Expenses when a 100% TIOU growth is used to determine the Budget, but as mentioned in section 6.7.1., 100% is not a realistic estimate. Table 6.28 also contains information on the individual universities' Differences between Budgeted and Actual Expenses, but in Table 6.28 a more realistic, though conservative, estimate is used and **only 50%** of TIOU growth is considered to determine the Budgeted Expenses.

Table 6.28: Expense difference at 50% of TIOU growth for individual universities

University	Expenses		Difference	Difference
	Actual2019 R('000)	Budget2019 R('000)	Budget-Actual R('000)	As % of Budget R('000)
Univ2	4,771,101	3,933,454	-837,647	-21.3%
Univ7	4,824,688	4,242,406	-531,494	-17.5%
Univ4	3,574,561	3,043,067	-582,282	-13.7%
Univ10	3,750,707	3,266,655	-369,675	-10.5%
Univ9	2,228,014	1,822,847	-484,052	-14.8%
Univ1	2,412,399	2,034,097	-319,514	-17.5%
UoT1	3,895,947	3,526,272	-378,302	-18.6%
Univ5	1,691,025	1,340,807	-350,218	-26.1%
Univ3	2,146,764	1,827,250	-149,409	-8.0%
Univ12	1,528,576	1,322,166	-405,167	-22.2%
UoT3	759,348	559,326	-128,029	-11.8%
Univ11	826,076	673,355	-34,823	-0.9%
UoT2	2,009,597	1,860,188	-200,022	-35.8%
Univ8	1,216,545	1,088,516	-152,721	-22.7%
Univ6	3,740,717	3,705,894	-206,410	-15.6%
UoT4	1,568,565	1,635,374	66,809	4.1%
Weighted mean	**2,559,039**	**2,242,605**	**-316,435**	**-14.11%**
Total	**40,944,630**	**35,881,678**	**-5,062,952**	**-14.11%**

Deduced from Table 6.28 is that the Differences between Actual and Budgeted Expenses vary from a negative R838 million for Univ2 to a positive R67 million (UoT4) for the individual universities at 50% TIOU growth. From the 16 sampled universities, 15 overspent on their Budgeted Total Expenses with R316 million on average, or R5.06 billion for all 16 sampled universities. This translates to a weighted average of 14.11% of the Budgeted Expenses, a big leap from the 1.2% positive weighted average depicted in Table 6.27, confirming that universities did not manage their Expenses efficiently. In Table 6.29 a more detailed analysis of the three Expense categories for the sampled universities is provided (Difference between Actual and Budgeted Expenses at a 50% TIOU growth). Included in Table 6.29 are the ratios of the differences to the Budget for each university.

Table 6.29: Analysis of elements of Expense difference at 50%

University	2019 Expense Difference at 50%							
	Expenses		Academic Salaries		Other Salaries		Other Expenses	
	R('000)	%	R('000)	%	R('000)	%	R('000)	%
Univ2	-837,647	-21.3%	-66,006	-5.5%	-482,637	-45.9%	-289,004	-17.1%
Univ4	-531,494	-17.5%	-98,460	-10.9%	-346,677	-34.7%	-86,356	-7.6%
Univ7	-582,282	-13.7%	-226,445	-14.4%	-343,273	-43.3%	-12,563	-0.7%
UoT1	-369,675	-10.5%	-53,969	-5.1%	-232,842	-21.5%	-82,863	-6.0%
Univ10	-484,052	-14.8%	-239,714	-24.4%	-183,261	-20.2%	-61,076	-4.4%
Univ3	-319,514	-17.5%	-60,261	-11.3%	-179,630	-34.5%	-79,623	-10.3%
Univ1	-378,302	-18.6%	5,918	0.8%	-175,181	-29.7%	-209,039	-28.6%
Univ5	-350,218	-26.1%	-89,831	-18.7%	-133,975	-37.2%	-126,412	-25.2%
UoT2	-149,409	-8.0%	8,877	1.3%	-131,895	-25.3%	-26,391	-4.0%
Univ9	-405,167	-22.2%	-203,050	-28.9%	-127,432	-19.6%	-74,684	-15.9%
Univ8	-128,029	-11.8%	17,737	4.9%	-105,328	-41.7%	-40,438	-8.5%
Univ6	-34,823	-0.9%	239,617	25.5%	-66,125	-4.7%	-208,315	-15.4%
UoT3	-200,022	-35.8%	-22,541	-10.6%	-33,413	-19.8%	-144,068	-81.1%
Univ11	-152,721	-22.7%	-43,608	-18.0%	-24,760	-10.3%	-84,353	-44.0%
Univ12	-206,410	-15.6%	-248,688	-96.9%	-16,511	-3.9%	58,788	9.2%
UoT4	66,809	4.1%	43,750	7.1%	109,444	19.8%	-86,384	-18.4%
Weighted Mean	**-316,435**	**-14.11%**	**-64,792**	**-9.06%**	**-154,593**	**-23.50%**	**-97,049**	**-15.13%**
TOTAL	**-5,062,952**		**-1,036,676**		**-2,473,495**		**-1,552,780**	

Total Actual Expenses were 14.11% more than the Budgeted Expenses, indicative of the sampled universities' inefficiency, not benefiting from Economies of Scale. However, the main conclusion from Table 6.29 is that Other Salaries are the biggest cause of the inefficient management of Expenses, since the weighted mean difference for Other Salaries is an overspending of 23.5% (see Table 6.29). Academic Salaries deviated only 9% from the Budget. Another concerning factor is the 15.13% Difference between Budgeted Other Expenses and Actual Other Expenses.

The significance of the differences contained in Table 6.28 and 6.29 was tested using one sample *t* tests related to the following hypotheses:

$H5_0$: The mean Actual Expenses are not significantly ≤ the mean Budgeted Expenses at 50% TIOU growth.
$H5_a$: The mean Actual Expenses are significantly > the mean Budgeted Expenses at 50% TIOU growth.

$H6_0$: The mean Actual Academic salaries are not significantly ≤ the mean Budgeted Academic salaries at 50% TIOU growth.
$H6_a$: The mean Actual Academic salaries are significantly > the mean Budgeted Academic salaries at 50% TIOU growth.

$H7_0$: The mean Actual Other salaries are not significantly ≤ the mean Budgeted Other salaries at 50% of TIOU growth.
$H7_a$: The mean Actual Other salaries are significantly > than the mean Budgeted Other salaries at 50% of TIOU growth.

$H8_0$: The mean Actual Other expenses are not significantly ≤ the mean Budgeted Other expenses at 50% of TIOU growth.
$H8_a$: The mean Actual Other expenses are significantly > the mean Budgeted Other expenses at 50% of TIOU growth.

The purpose of the *t* tests performed to test H5 to H8 was to establish whether Actual Expenses increased significantly more than expected when taking the Nominal TIOU growth rate (Index) using 50% of the growth in TIOU into account. This Nominal TIOU growth rate (50%) was again used to establish an Indexed Budget set at 100%. The results of these *t* tests are presented in Tables 6.30 and 6.31. Any mean difference above the Indexed 100% illustrates an overspending on the universities' side. Any mean difference below the Indexed 100% is an indication that universities spent less than the Benchmarked Budget for the purpose of this study.

Table 6.30: Actual versus Budgeted Expenses at 50% TIOU growth (H5 to H8)

	N	Mean	Std. Dev.	Std. Error Mean
Actual Total Expenses Growth/Index (50%) H5	16	115.13%	9.59%	2.40%
Actual Academic Salaries Growth/Index (50%) H6	16	112.22%	26.34%	6.58%
Actual Other Salaries Growth/Index (50%) H7	16	122.53%	17.08%	4.27%
Actual Other Expenses Growth/Index (50%) H8	16	116.67%	20.87%	5.22%

Table 6.31: Expenses (50%): One sample *t* test (H5 to H8)

	Test Value = 100				
	t	df	Significance One-Sided *p*	95% Confidence Interval Lower	Upper
Actual Total Expenses Growth/Index (50%) H5	6.313	15	0.000**	10.02%	20.24%
Actual Academic Salaries Growth/Index (50%) H6	1.856	15	0.042*	-1.82%	26.25%
Actual Other Salaries Growth/Index (50%) H7	5.275	15	0.000**	13.42%	31.63%
Actual Other Expenses Growth/Index (50%) H8	3.196	15	0.003**	5.55%	27.79%

***Significant at <1%; *Significant at <5%*

Deduced from the means reported in Table 6.30, Total Expenses grew 15.13% more than the Indexed growth rate when taking 50% of the TIOU growth into account. From the three categories comprising the Total Expenses, the highest growth above the Index was Other Salaries at 22.53%, with the lowest overspending taking place in Academic Salaries (12.22%); the only Expense where there is a direct input-output link to the number of TIOUs. Other Expenses also grew at a higher rate (16.67%) than the Index used in Table 6.30.

The *t* test results depicted in Table 6.31 show that the Difference between Actual Total Expenses and the Indexed Budget (100% = Test value) is significant with a *p* value of .000**. The same results were achieved for the Differences between the Actual and Indexed Budgeted Academic Salaries, Other Salaries and Other Expenses, all differences being significant at the 0.05 level.

The significance determined in Table 6.31 leads to the rejection of $H5_0$, which means that the mean Actual Total Expenses are significantly more than the mean Budgeted Total Expenses at 50% TIOU growth. $H6_0$ is the next hypothesis rejected by the significance stated in Table 6.31; therefore, the mean Actual Academic Salaries are significantly more than the mean Budgeted Academic Salaries at 50% TIOU growth. The same conclusion is drawn with regards to Other Salaries and Other Expenses, rejecting both $H7_0$ and $H8_0$ and confirming that the mean Actual Other Salaries and Other Expenses are significantly more than the Budgeted Other Salaries and Other Expenses at 50% TIOU growth.

The main deduction from testing H5 to H8 is that Other Salaries were the main driver of the significant Difference between Actual and Budgeted Expenses at universities. If

Academic Salaries were responsible, there might be an argument in favour of improved academic quality by decreasing the student to staff ratio. However, universities did not increase their academic staff to the same extent as their other staff, highlighting that universities did not manage their Expenses efficiently. Since the increased spending took place in Other Salaries, there is little justification for the Expenses and the lack of an input-output relationship between enrolments and Other Salaries added to the inability of universities to benefit from Economies of Scale.

From the results reported in Tables 6.30 to 6.31 it is accepted that universities' Actual Expenses were significantly more than their Budgeted Expenses in 2019, using the Indexed growth rate at 50% TIOU growth as a Budgeted benchmark. A further deduction from these Tables is that Other Salaries were the biggest contributor to this overspending. From the statistical analysis performed in section 6.7.2, it also seems as if universities funded the overspending incurred by increasing Tuition Fees significantly. The following section explores what the impact of the growth in TIOUs was on the findings explained by testing H1 to H8.

6.8. The impact of growth

The first set of inferential statistical analyses performed in this study was to determine whether there were significant Differences between Actual and Budgeted Revenue and Expenses incurred at the universities included in the sample for this study. The conclusions from the findings of these tests were a) universities did not manage their Expenses efficiently, and accordingly b) did not benefit from Economies of Scale as is expected in an environment with predominantly fixed costs, c) the inefficiency was primarily related to the increase in Other Salaries, and d) the inefficiency was predominantly funded by the increase in Tuition Fees.

In this section the focus is on the growth in TIOUs and how it impacted the overspending on Budgeted Expenses and the increase in Actual Revenue above Budgeted Revenue. As mentioned before, traditional universities are already experiencing disruption with the risk of losing enrolments. The research question to be addressed is to establish how dependent the sampled universities are on an increase in enrolments (TIOUs) to cover the increase in Total Expenses; thus, to survive financially. The hypothesis related to this research question is:

$H9_0$: There exists no significant relationship between the growth rate in TIOUs (enrolments) and the mean Budgeted less Actual Total Expenses.
$H9_a$: There exists a significant relationship between the growth rate in TIOUs (enrolments) and the mean Budgeted less Actual Total Expenses.

In Tables 6.32 and 6.33 a regression analysis was done with the Difference between Budgeted and Actual Expenses as the dependent and TIOU growth the independent variable. It is important to note that if the Actual Expenses exceeded the Budgeted Expenses, it is reflected as negative overspending.

Table 6.32: Budgeted less Actual Total Expenses versus the growth in TIOUs

		Budgeted - Actual Total Expenses	**TIOU Growth**
Pearson Correlation	Budgeted – Actual Total Expenses	1.000	0.726
	TIOU Growth	0.726	1.000
Sig. (1-tailed)	Budgeted – Actual Total Expenses		0.001**
	TIOU Growth	**0.001****	
N	Budgeted – Actual Total Expenses	16	16
	TIOU Growth	16	16

***Significant at <1%; *Significant at <5%*

Table 6.33: Budgeted less Actual Total Expenses versus the growth in TIOUs (regression)

R	R^2	**Adjusted R^2**	**Sig. *F* Change**
.726	0.527	**0.494**	**0.001 ****

***Significant at <1%; *Significant at <5%*

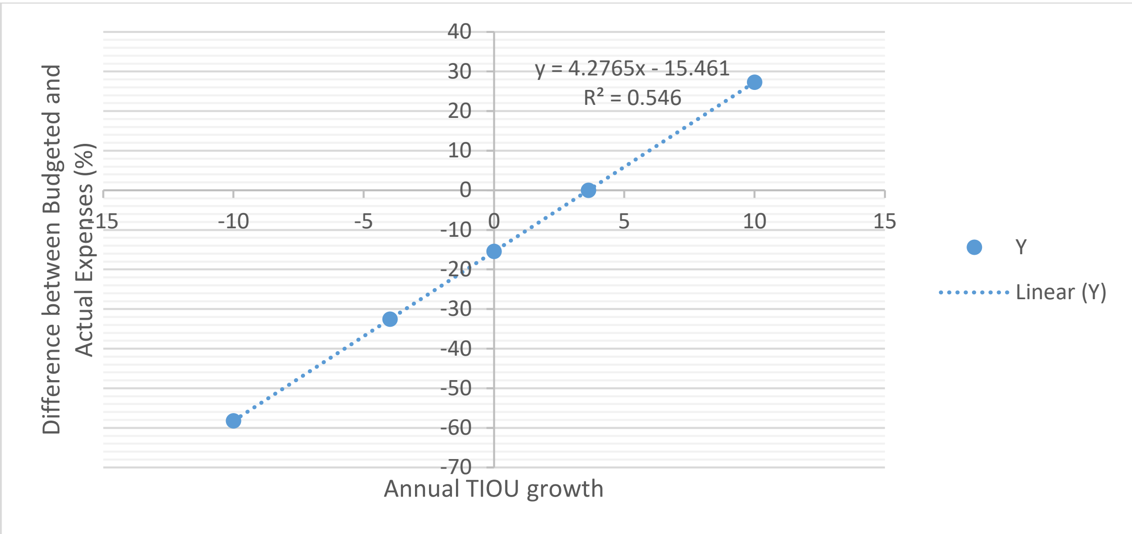
Table 6.32 illustrates that the overspending on Total Expenses is more negative, the lower the growth rate in TIOUs, as confirmed by the strong positive correlation between the Difference in Budgeted less Actual Expenses and the TIOU growth rate of 0.726. Hence, almost 50% of the overspending on Expenses is directly related to the low growth in TIOUs (Adjusted R^2=0.494). These results are concerning, since it confirms that the sampled South African universities need TIOU growth to cover their Expenses, highlighting the inefficiency of South African universities to manage their Expenses. The concern relates to what the prospects are for South African universities if there is no or negative enrolment growth. The significance (sig. = .001**) of the correlation (*r* = 0.726) between Budgeted less Actual Total Expenses and the growth in TIOUs confirms that $H9_0$ is rejected. Therefore, there exists a significant relationship between the growth rate in TIOUs (enrolments) and the mean Budgeted less Actual Total Expenses. This relationship is expressed by the related regression model in Equation 6.3.

Equation 6.3: Regression model to predict Expense difference as influenced by TIOU growth

$$y = 4.2765x - 15.461$$

From Equation 6.3 it is established that if universities experience no growth (x = 0) they will still spend 15.461% more than the Budgeted benchmark based on Nominal TIOU growth. From Equation 6.3, the following regression graph is prepared:

Figure 6.1: Regression graph to predict Expense differences as influenced by TIOU growth



From Figure 6.1, for Actual Expenses incurred at universities to be the same as the Budgeted Expenses, universities require an annual growth rate in TIOUs of 3.62%. Any growth less than 3.6% per annum will cause universities to spend more than the Budgeted benchmark. From this graph and Equation 6.3 it is also deduced that a 4.28% decrease in enrolments will mean a 32.6% overspending for universities, an indication that the less growth universities experience, the more inefficient they become in managing their Expenses. This is a concerning picture, since all indications are that universities will experience enrolment decreases in the near future (see Chapter 3).

In Tables 6.34 and 6.35 another regression analysis was performed with Actual less Budgeted Total Revenue as the dependent and TIOU growth as the independent variable. The hypothesis tested through this regression analysis is as follows:

$H10_0$: There exists no significant relationship between the growth rate in TIOUs (enrolments) and the mean Actual less Budgeted Total Revenue.
$H10_a$: There exists a significant relationship between the growth rate in TIOUs (enrolments) and the mean Actual less Budgeted Total Revenue.

When interpreting the results from the regression analysis performed in testing H10, a positive difference (i.e. Actual > Budgeted) is regarded as negative. From the results depicted in Tables 6.34 and 6.35, universities are dependent on increasing their Revenue more than their Budget as their growth in TIOU slows down. Since Budgeted Revenue is calculated taking TIOUs into account, the only Revenue streams universities can change at their own discretion is Tuition Fee Income and Other Income. The result of this regression also shows that the Revenue universities received over and above the Budgeted Revenue is negatively related to the growth in TIOUs, with a negative Correlation coefficient of -0.553. Hence, the lower the TIOU growth, the more the Actual Revenue is above Budget.

Table 6.34: Actual less Budgeted Total Revenue versus the growth in TIOUs

		Actual – Budgeted Total Revenue	**TIOU growth**
Pearson Correlation	Actual – Budgeted Total Revenue	1.000	-0.553
	TIOU growth	-0.553	1.000
Sig. (1-tailed)	Actual – Budgeted Total Revenue		0.013*
	TIOU growth	**0.013***	
N	Actual – Budgeted Total Revenue	16	16
	TIOU growth	16	16

***Significant at <1%; *Significant at <5%*

Table 6.35: Actual less Budgeted Total Revenue versus the growth in TIOUs (regression)

R	R^2	**Adjusted R^2**	**Sig. *F* Change**
0.553	0.305	**0.256**	**0.026***

***Significant at <1%; *Significant at <5%*

The Adjusted R^2 of 0.256 as provided in Table 6.35 indicates that 25.6% of the Revenue the sampled universities received above the Budget could be explained by the TIOU growth. The results in Tables 6.34 and 6.35 lead to the rejection of $H10_0$ because of the significance (sig. = .013*) of the correlation *(r* = -0.553) that exists between the Difference in the Actual and Budgeted Total Revenue and the TIOU growth. The relationship between growth rate in TIOUs (enrolments), and the mean Actual less Budgeted Total Revenue is therefore significant. Again, the concern is that the significant negative relationship implies that the less the growth in TIOUs, the more the universities need to increase their Actual Revenue above Budget, and the only two options are to increase Tuition Fees or Other Revenue.

In Tables 6.36 and 6.37 a regression between Actual less Budgeted Total Revenue (dependent variable) and Budgeted less Actual Total Expenses (independent variable) was conducted. The related hypothesis is as follows:

$H11_0$: There exists no significant relationship between Budgeted less Actual Total Expenses and Actual less Budgeted Total Revenue.

$H11_a$: There exists a significant relationship between Budgeted less Actual Total Expenses and Actual less Budgeted Total Revenue.

The results from the testing of H11 are a cause for concern. The more the universities overspend, the more their Actual Revenue needs to increase, which implies that if universities do not improve their efficiency, they will have to keep on increasing Tuition Fees. This is indicated by the strong negative correlation that exists between Actual less Budgeted Revenue and Budgeted less Actual Expenses *(r* = -0.697) as indicated in Table 6.36.

Table 6.36: Actual less Budgeted Total Revenue versus the Budgeted less Actual Total Expenses

		Actual - Budgeted Total Revenue	Budgeted - Actual Total Expenses
Pearson Correlation	Actual - Budgeted Total Revenue	1.000	-0.697
	Budgeted - Actual Total Expenses	-0.697	1.000
Sig. (1-tailed)	Actual - Budgeted Total Revenue		0.001**
	Budgeted - Actual Total Expenses	**0.001****	
N	Actual - Budgeted Total Revenue	16	16
	Budgeted - Actual Total Expenses	16	16

***Significant at <1%; *Significant at <5%*

Table 6.37: Actual less Budgeted Total Revenue versus the Budgeted less Actual Total Expenses (regression)

R	R^2	**Adjusted R^2**	**Sig. *F* Change**
.697a	0.486	**0.449**	**0.003****

***Significant at <1%; *Significant at <5%*

From the results of the regression analysis provided in Tables 6.36 and 6.37, the significance (sig. = .001**) of the correlation *(r* = -0.697) between the Difference in Actual and Budgeted Total Revenue and the Difference in Budgeted and Actual Total Expenses means that $H11_0$ is rejected. The rejection of $H11_0$ confirms that there exists a significant relationship between Budgeted less Actual Total Expenses and the Actual less Budgeted Total Revenue. The regression model illustrated in Table 6.37 further confirms the dependency of universities on either Tuition Fees or Other Income to cover their Expenses, since almost 45% (Adjusted R^2=0.449) of the change in the Difference between Actual and Budgeted Revenue can be explained by a change in the Difference between Budgeted and Actual Expenses. What is critical to remember is that both the Budgeted Revenue and Budgeted Expenses were based on the growth in TIOUs. The deductions from the testing performed in this section referring to the sampled universities from 2010 to 2019 are therefore, a) Actual Total Expenses above Budget were the highest where TIOUs grew the least, b) Actual Total Revenue above the Budget were the highest where TIOUs grew the least, and c) the more Actual Total Expenses exceeded the Budget, the more Actual Total Revenue had to increase.

6.9. Summary

Universities globally are at a crossroads. The higher education environment is changing rapidly. COVID-19 and the resulting expedition of the 4IR could seriously impact the future of traditional universities in terms of their relevance and competitive advantage and, accordingly, number of enrolments and financial sustainability. The higher education environment in South Africa is also facing changes, but has unique challenges that force universities to ensure that they provide affordable education that will ensure employability.

This chapter started off with descriptive statistics of the sampled universities. These descriptive statistics focused on the Revenue streams and Expense categories of the universities included in the sample for this study. The composition of Revenue and Expenses was considered both on a Weighted average and Mean basis as a percentage of Total Revenue. The composition of Expense categories was then also analysed in terms of Total Expenses.

The inferential statistics and related hypotheses tested in this chapter supported the findings from the descriptive statistics. The inferential statistical tools applied in this chapter included one sample *t* tests and regression analysis. The focus of the inferential statistics was to determine whether universities deviated significantly from what was expected in terms of the different Revenue streams and Expense categories. This expectation was calculated as the Nominal TIOU growth rate and this growth rate was applied as an Index to express the actual growth in variables in relation to this Index.

The final part of this chapter considered the impact of growth on the deviation of universities from the benchmarked Budgeted Revenue and Expenses establishing the dependence of universities on TIOU growth to manage their Expenses efficiently and as a result control increases in Revenue. The literature reviewed in this study confirmed that traditional universities are facing a disruptive environment, potentially losing their competitive advantage, and thus facing a decline in enrolments. Another focus of the literature review was that Management and Cost accounting does not necessarily provide a means to address the management of Overhead costs, which are typically fixed or period costs with no input-output relationships. The focus in this empirical chapter was to assess whether the sampled universities, even prior to the disruption, were well managed from an efficiency and Economies of Scale perspective. This created the platform to extrapolate what will happen to traditional universities in the future if they lose their relevance. The next chapter will conclude this study by expanding on the findings from this empirical portion of the study. The findings will also be applied to make recommendations to universities in response to the results from this chapter.

Chapter 7 – Conclusions and recommendations

7.1. Introduction

Chapter 1 of this study emphasised that universities are at a crossroads. Universities in South Africa are facing financial pressure for various reasons, expanded on in Chapter 1 of this study (Koornhof, 2020, para. 1). Universities must rethink both 'What' and 'How' they teach if they are to remain financially sustainable. The competitive advantage of traditional universities in terms of geographic location and low cost of education is declining as the global higher education environment moves towards online education (Collub, 2016, para. 21).

In Chapter 2 the researcher investigated the application of Management and Cost accounting at universities as a key in providing management with critical information to make the required decisions that will ensure financial sustainability (Serfontein and Smit, 2021, pp. 180, 184). However, the application of the related Management and Cost accounting tools remains limited in the modern business environment, especially in service organisations with intangible cost objectives. In service organisations, the intangibility of the cost objective means that it is difficult to identify an input-output relationship. This lack of a causal input-output relationship increases when high Overhead costs are present. These Overhead costs are Indirect, with no causal relationship to the organisation's output, an accurate description of the cost structure of universities.

The literature reviewed in Chapter 3 focused on the disruption faced by the global business environment with a specific focus on the disruption at universities and, more specifically, South African universities. What was, however, clear from the findings of the literature reviewed is that disruption provides the backdrop to stop activities that do not drive the organisation towards a new, desired future (Amato, 2020b, p. 4). Focusing only on new activities to address the consequences of disruption, without reassessing existing activities, could be a possible explanation for the increase in Expenses at South African universities.

The disruption investigated in Chapter 3 confirmed that universities need to make certain decisions. The need for decision-making highlighted the application of Management and Cost accounting at universities. Chapter 4 discussed this application in detail. The main findings from Chapter 4 were that the application of Management and Cost accounting in universities is complex. This complexity arises due to the intangible nature of the cost objective (service) delivered by a university as typical service organisation. The diversity of services provided at a university adds to this complication, together with the Joint cost nature and the fixed behaviour of most costs incurred at universities, consisting primarily of Academic and Other staff Salaries.

The findings from Chapter 4 provided the base for the research methodology applied in this study, as discussed in detail in Chapter 5. This study followed a quantitative, exploratory approach based on a positivism paradigm. Chapter 5 further explained the statistical tools applied in the empirical part of this study.

Chapter 6 described the results from the empirical part of this study. The empirical study focused on the analysis of the Financial Statements of the 16 sampled South African universities. These Financial Statements were assessed from a Management and Cost accounting perspective focusing on efficiency and Economies of Scale. The results of the financial analysis were statistically analysed. The statistical analysis included descriptive and inferential statistics.

This chapter (Chapter 7) presents the conclusion on the findings from the empirical study conducted and reported in Chapter 6. The objective of Chapter 7 is to summarise the findings from this research study by providing an analysis of the results from the testing performed in Chapter 6. The conclusions presented in Chapter 7 are further based on the findings from the literature review conducted and the outcomes from the data analysis as presented in Chapter 6. In this chapter, the study's primary and secondary objectives are analysed to determine which objectives were achieved with success and which were not. Included in this chapter is also a summary of the hypotheses tested, clearly indicating which hypotheses are accepted, and which are rejected, detailing the conclusions drawn from the hypotheses. This chapter includes the recommendations from the findings of this study and how this study contributes to the field of Management and Cost accounting, together with an outline of the limitations experienced in performing the study. This chapter ends with recommendations for future research opportunities.

7.2. Assessment of primary and secondary objectives

From the literature reviewed in the performance of this study, it seems unavoidable that universities will face a significant decrease in enrolments in the near future. The primary cause for this decrease is increased competition in terms of relevance and cheaper international online education. This possibility raises a few questions, resulting in the origin of this study. What happens when students can study more relevant modules for free at the best institutions in the world? What happens to universities, with the majority of their costs being fixed, if student numbers decline? How will these institutions cover their costs if their funding decreases significantly in an industry notorious for its slow pace of adapting to change?

These questions can be answered by applying Management and Cost accounting principles effectively in this environment of diverse service delivery to increase the efficiency of universities. Unfortunately, research focusing on the application of Management and Cost accounting in the service environment remains limited, despite a large amount of research focusing on its application in the manufacturing and retail environment. Since costing practices were initially developed for manufacturing organisations, the difference in research quantity regarding costing services instead of the costing of goods is understandable (Terzioglu and Chan, 2013, p. 29; Mohr, 2017, p. 91).

The lack of research referring to Management and Cost accounting application in services also relates to universities as service organisations delivering a diverse range of services. Unfortunately, this lack of literature only adds to the crisis faced by South African universities, since it has been proven empirically that South African universities did not benefit from Economies of Scale by improving their efficiency; thus they are very exposed to any disruption that could potentially lead to a substantial decline in enrolments, as indicated in the literature study. The question is not whether it will happen, but how soon the decline will hit South African universities?

In reply to the issue surrounding the relevance of South African universities, this study addresses the gap in the literature with reference to the application of Management and Cost accounting at South African universities. Part of addressing the gap in the literature is an investigation of how Management and Cost accounting principles can assist South African universities in addressing the challenges they currently face and could face in the future. This includes relevance by freeing up resources to make the required leap, both in capital investment and staff training, to a blended learning approach, for these organisations to regain their relevance. The primary objective of this study was therefore to apply Management and Cost accounting principles to assess the efficiency of South African universities from a financial management point of view as typical service organisations in a disruptive environment.

In support of the primary objective of the study, various secondary objectives were formulated before conducting the study. The secondary objectives of the study consisted of theoretical and empirical objectives. They were:

Theoretical secondary objectives:

- Explore the historical development and application of Management and Cost accounting in service organisations;
- Assess the disruption organisations are facing globally;
- Explore the application of Management and Cost accounting in universities, both globally and in South Africa.

Empirical secondary objectives

- Apply the principles of Management and Cost accounting to assess the efficiency with which the sampled South African universities, from a financial and historical perspective, were managed by analysing the Financial Statements for a sample of universities for 2010, 2015 and 2019;
- Evaluate the performance of the Revenue streams of South African universities in terms of the Budgeted benchmark (related to TIOU growth) from 2010 to 2019;

- Evaluate the performance of the Expense categories of South African universities in terms of the Budgeted benchmark (related to TIOU growth) from 2010 to 2019;
- Determine the extent and significance of the relationship between TIOU growth and the Difference between Actual and Budgeted Revenue and Expenses at South African universities.

The primary objective and the seven secondary objectives of this study as stated above were evaluated against the findings from the literature reviewed and the empirical assessment performed in Chapter 6. The outcome of this evaluation is summarised in Table 7.1. The objectives, related outcomes, and status of the objective are provided in Table 7.1. The primary objective and the seven secondary objectives of this study were achieved.

Table 7.1: Assessment of primary and secondary objectives

Primary objective			
No.	**Initial objective**	**Outcome**	**Status**
1.	To apply Management and Cost accounting principles to assess the efficiency at South African universities as typical service organisations in a disruptive environment	The efficiency with which South African universities managed their finances was tested during the empirical portion of this study. The measurement for efficiency was the Nominal TIOU growth rate used as the base for the 2019 Budget. Actual Revenue and Expenses were measured against this Budget, and any overspending or over-receipt was analysed further to establish efficiency.	Achieved
Secondary objectives			
1.	Explore the historical development and application of Management and Cost accounting in service organisations	Chapter 2 of this study reviewed available literature focusing on the development of Management and Cost accounting. Part of this development was to consider how Management and Cost accounting is applied in a global business environment dominated by service organisations that are characterised by a change in their cost	Achieved

		structures, from primarily direct, variable costs to mostly indirect and fixed costs.	
2.	Assess the disruption organisations are facing globally	In Chapter 3, various global disruptions to the business environment were considered. These disruptions included Technological disruption (including the impact of COVID-19) and the 4IR. These disruptions were also narrowed down to universities, and the impact of intellectual commercialisation, COVID-19 and the #FeesMustFall campaign was considered. The relevance of South African universities was another factor affected by disruptions that were investigated.	Achieved
3.	Explore the application of Management and Cost accounting in universities, both globally and in South Africa	The primary focus of Chapter 4 was to explore the application of Management and Cost accounting in a diverse service environment as characterised by universities. Part of the achievement of this objective was to determine how costs incurred at universities behave with the conclusion that most costs incurred at universities are fixed without a causal input-output relationship to enrolments and should not necessarily be affected by an increase in the number of enrolments. However, the risk of not being financially sustainable if enrolments should suddenly decline at universities with predominantly fixed costs will be substantial.	Achieved
4.	Apply the principles of Management and Cost accounting to assess the efficiency with which the sampled South African universities, from a financial and historical perspective, were managed by analysing	The financial results of the 16 sampled universities were analysed using Management and Cost accounting principles. The results of the financial analysis were also tested for significance. The analysis focused on Revenue and Expenses and considered the growth and composition of the various Revenue streams and Expense categories from	Achieved

	the Financial Statements for a sample of universities for 2010, 2015 and 2019	2010 to 2019. Statistical analysis was then performed using the results of the financial analysis. The statistical analysis considered the growth in the Revenue streams and Expense categories of the sampled universities in relation to the Nominal TIOU growth rate. This growth rate served as an Index to establish a Budgeted benchmark. This benchmark was utilised to measure the efficiency with which the sampled universities managed their Expenses over the nine-year period from 2010 to 2019.	
5.	Evaluate the performance of the Revenue streams of South African universities in terms of the Budgeted benchmark (related to TIOU growth) from 2010 to 2019	Focusing on Revenue, the Actual Income from the three Revenue streams of universities for the purpose of this study (i.e. Subsidies and Grants, Tuition Fee Income and Other Income) were measured against the Budgeted benchmark. The primary finding is that universities received more Revenue than what they should have received when considering TIOU growth and inflation. The Revenue stream with the biggest percentage increase above the Budgeted benchmark was Tuition Fee Income. In this case, receiving more Revenue than the Budgeted benchmark is a negative finding since the Income was not due to improved sourcing of funds (i.e. Other Income) but as a result of Tuition Fee increases to the detriment of students.	Achieved
6.	Evaluate the performance of the Expense categories of South African universities in terms of the Budgeted benchmark (related to	The same analysis as for the Revenue streams above was performed for the Expense categories of the sampled universities (i.e. Academic Salaries, Other Salaries, and Other Expenses). Each Expense category's actual spending was compared to the Budget based on the growth in TIOU and inflation. From the testing performed, the Expense category	Achieved

	TIOU growth) from 2010 to 2019	with the biggest overspending incurred (as a percentage of the Budgeted benchmark) was Other Salaries. If the overspending had occurred in Academic Salaries, there could have been an argument in favour of improved teaching quality by decreasing the staff to student ratio since Academic Salaries is the only Expense with a direct causal input-output relationship to enrolments. However, universities did not increase their academic staff to the same extent as their other staff, highlighting that universities did not manage their Expenses efficiently. Since the increased spending took place in Other Salaries, there is little justification for the Expenses and the lack of an input-output relationship between enrolments and Other Salaries added to the inability of universities to benefit from Economies of Scale.	
7.	Determine the extent and significance of the relationship between TIOU growth and the Difference between Actual and Budgeted Revenue and Expenses at South African universities	Regression analysis was applied to determine the extent and significance of the impact of TIOU growth on the over-receipt of Revenue and overspending of Expenses. From the testing performed, the growth in TIOU had a strong, significant relationship with the Difference between Actual and Budgeted Revenue and Expenses. For both Revenue and Expenses, the Difference between Actual and Budgeted indicated a negative finding towards the efficiency with which the sampled universities managed their Revenue and Expenses, with the main conclusion that the lower the growth in TIOU, the greater the Difference between Actual and Budgeted Revenue and Expenses. This presents a serious concern, namely that universities need growth in enrolments over time to cover their	Achieved

		Expenses, which is a clear indication of inefficiency in managing their Expenses.	

As specified in Table 7.1, the primary and all secondary objectives of this study were achieved. These objectives were achieved by the review of literature as well as the empirical testing performed. The empirical analyses performed in this study included descriptive and inferential statistics. The following section describes the findings from the statistical analyses performed in detail.

7.3. Statistical conclusions

In this section, the deductions from the findings of the empirical testing performed in Chapter 6 are used to draw statistical conclusions. The statistical analysis in Chapter 6 was performed using both Microsoft Excel and SPSS software. The conclusions were drawn from focused descriptive statistics and hypothesis testing using inferential statistical analysis.

7.3.1. Descriptive statistics

The data analysis performed in the empirical part of this study included both descriptive and inferential statistics. The descriptive statistics included two areas. The first area was an analysis of the Statement of Comprehensive Income.

The analysis of the Statement of Comprehensive Income focused on the composition of Revenue and Expenses of the sampled universities for 2010, 2015 and 2019. The analyses performed firstly considered the average composition of both Revenue and Expenses. The empirical aims to address the secondary objective to apply the principles of Management and Cost accounting to assess the efficiency with which the sampled South African universities, from a financial and historical perspective, were managed by analysing the Financial Statements for a sample of universities for 2010, 2015 and 2019 were a) to observe whether there was a change in the composition of Revenue streams and categories of Expenses; b) whether the weighted average and mean gave different answers regarding the composition of Revenue streams and Expense categories; and c) what has happened to the Net surplus of the sampled universities (although the Net surplus was not the main focus of the study). The outcomes of the aims addressed in the first part of the empirical analyses were a) the composition of the Revenue streams and the Expense categories changed from 2010 to 2019; b) there were small differences between the Weighted average and the Mean for the various Revenue streams and Expense categories, but the differences were small enough to ensure that a few large (or small) universities in the sample did not distort the data; and c) that the Net surplus of the sampled universities experienced a 260% increase from R114 million in 2010 to R410.3 million in 2019.

The next focus of the descriptive statistics is the growth or increase in the Revenue streams and Expense categories for the sampled universities. South African universities experienced a substantial increase in enrolments (Koornhof, 2020, para. 7; Mtshali, 2020, para. 19). From a Management and Cost accounting perspective this growth should have ensured that, in an environment with primarily fixed costs, universities benefited from Economies of Scale and, therefore, improved their efficiency. The impact of the growth in enrolments (using TIUs and TOUs (TIOUs), together with the effect of inflation (Nominal TIOU growth) on the efficiency with which universities managed their Revenue and Expenses, were considered.

The Total Revenue of the sampled universities increased by 124.9% from 2010 to 2019, a rate more than double the inflation rate over the same period. For this study, Revenue consisted of three streams, i.e. Subsidies and Grants, Tuition Fee Income and Other Income. If the growth in Revenue had been caused by Other Income that increased, the growth would have been acceptable, since it meant that universities actively expanded their Income base. Unfortunately, Tuition Fee Income experienced the highest growth of the three Income streams at a growth rate of 147.9% from 2010 to 2019. Universities often blame the increase in Tuition Fees on the decline in Government Subsidies and Grants, but from the analysis in Chapter 6, Subsidies and Grants also increased above the inflation rate from 2010 to 2019. This increase in Tuition Fees implies that, in a country desperate for affordable higher education, the needs of the students were not met.

Part of the data analysis performed in Chapter 6 was to place the growth in Revenue and Expenses in context with the growth in TIOUs and inflation. The researcher is of the opinion that TIUs and TOUs (TIOUs) are the two most relevant measures of the increase in enrolments. When the growth in the Revenue streams was adjusted for TIOU growth and inflation (Nominal TIOU growth rate), it was found that the Total Revenue of the sampled universities grew more than the Nominal TIOU growth rate. Again, considering the three Revenue streams applicable to this study, the biggest increase above the Nominal TIOU growth rate occurred in Tuition Fee Income, amounting to an over-receipt of around R149 million per university. Other Revenue indicated a negative growth adjusted with TIOU growth and inflation, while Subsidies and Grants only grew 2.28% more than the Nominal TIOU growth rate. Given that Subsidies and Grants grew faster than inflation and TIOUs, there was no justification for the growth in Tuition Fees.

When moving onto the growth in Expenses, it was deduced that the sampled universities did not manage their Expenses efficiently. When considering the growth in Expenses from a Management and Cost accounting perspective, the increase in Expenses is problematic, since the review of literature in Chapter 4 established that most costs incurred at universities are fixed costs without a causal input-output relationship. Where there is a lack of an input-output relationship, the application of traditional Management and Cost accounting becomes challenging. If the increase in Expenses had been related to Other Expenses, the increase would have been understandable in the light of technological developments as is characteristic of the modern business environment (see Chapter 3). However, despite the lack of a causal input-output relationship, Salaries was the Expense category that increased the most.

If Academic Salaries were the primary Expense category that increased, the increase would again be more understandable, since Academic Salaries is the only Expense category with a direct causal relationship with enrolment growth, but the increase is related to Other Salaries. In a world of technology and automation, combined with the fact that Other Salaries are indirect, with almost no causal relationship to an increase in enrolments, this trend is concerning. Other Salaries is an area where universities should have benefited from Economies of Scale, which does not seem to be the case. This also highlights the inability of Management and Cost accounting to manage Overhead costs effectively.

Given the fixed nature of the costs incurred at universities, Expenses should not have grown above the Nominal TIOU growth rate. When Expenses are considered from the Index based on the Nominal TIOU growth rate, two different scenarios apply. The first scenario took 100% of the growth in enrolments (TIOUs) into account, and the second scenario included only 50%. Even though 50% is a more likely, yet conservative, scenario, the 100% scenario was included to provide more conclusive findings.

When the Expense categories were analysed using the Nominal TIOU growth rate taking 100% TIOUs into account, Expenses grew at a higher growth rate than the Nominal TIOU growth rate from 2010 to 2019, but by a very small margin. However, what is a factor to address is that Academic Salaries declined relative to the Nominal TIOU growth, while Other Salaries grew at the highest rate of all Expense categories. Academic Salaries are the only Expenses at a university where there is a direct causal relationship with the number of student enrolments; yet this is not reflected in the analyses performed.

Other Salaries, however, are a major concern. Other Salaries increased by 7.74% above inflation and TIOU growth. Service organisations, like universities, are supposed to benefit from Economies of Scale, specifically where there is no direct causal relationship between inputs and outputs like with Other Salaries, which did not happen. In addition, technology and automation should have resulted in savings in terms of Other Salaries (consisting typically of Overhead costs).

When a more realistic growth rate is applied (inflation plus 50% TIOU growth), universities have become even less efficient in managing their Expenses. In this scenario, Other Salaries grew with 23.01% above the Nominal TIOU growth rate, compared to Total Expenses, which outgrew TIOU growth and inflation with 14.22%. These findings again illustrate the inefficient management of costs at universities from 2010 to 2019 from a Management and Cost accounting perspective. Where most costs, due to their fixed nature, should have benefited from Economies of Scale and technological developments, the growth over and above inflation and 50% of TIOU growth prove the opposite. Applying this Nominal TIOU growth rate and calculating the Rand value, the Net surplus per university was almost R317 million less than what it should have been. This is a 43.54% underperformance, compared to the Budgeted

Net surplus. The main contributors to this negative scenario are Other Salaries and Other Operating Expenses, both consisting primarily of Overhead costs with no direct causal relationship to student enrolments. The findings from the descriptive statistics for the 16 sampled universities in total are summarised in Table 7.2.

Table 7.2: Financial results for the 16 sampled universities

	Total for the 16 sampled universities					
	2010	**2019**	**2019**	**2010-2019**	**2019**	**2019**
	Actual R('000)		**Budget R('000)**	**Growth as %**	**Actual less Budget 2019 R('000)**	**Actual less Budget 2019 % Budget**
Revenue (100%)	**21,122,278**	**47,509,085**	**44,796,940**	**124.92%**	**2,712,145**	**6.05%**
Subsidies & Grants	11,025,874	23,917,660	23,384,098	116.92%	533,562	2.28%
Tuition/Fee Income	6,651,048	16,486,130	14,105,799	147.87%	2,380,331	16.87%
Other Income *	3,445,356	7,105,295	7,307,044	106.23%	-201,749	-2.76%
	Actual R('000)		**Budget R('000)**	**Growth as %**	**Budget less Actual 2019 R('000)**	**Budget less Actual 2019 % Budget**
Expenses (50%)	**19,298,947**	**40,944,630**	**35,881,678**	**112.16%**	**-5,062,952**	**-14.11%**
Personnel costs	11,826,687	25,480,510	21,970,338	115.45%	-3,510,172	-15.98%
Academic Salaries	6,137,969	12,482,181	11,445,505	103.36%	-1,036,676	-9.06%
Other Salaries	5,688,718	12,998,329	10,524,834	128.49%	-2,473,495	-23.50%
Other Expenses	7,472,260	15,464,120	13,911,340	106.95%	-1,552,780	-11.16%
Inflation (always 100%) + TIOU Growth	TIOU	Growth =	100%	112.08%		
	TIOU	Growth =	50%	85.75%		

Table 7.2 provides the summarised total data for the 16 sampled universities based on the findings in this section. From 2010 to 2019, Revenue increased with 124.9%, with Tuition Fees the main contributor, with a growth rate of 147.9%. When both figures are compared to the Nominal TIOU growth rate at 100% TIOU growth of 112.08% it is clear that universities did not meet student needs at all. Given the increase in Tuition Fees, South African universities failed to provide affordable education to students. When Actual Revenue is compared to the Budget, universities received over R2.7 billion more than the Budgeted benchmark, with almost the total amount due to Tuition Fee increases. When considering the Expenses incurred at universities, using the more realistic, though conservative, Nominal TIOU growth rate taking 50% of TIOU growth into account, Expenses grew with 112.16% from 2010 to 2019. This growth was 26.41 percentage points more than the Nominal TIOU growth rate at 50% (85.75%), amounting to R5 billion more than the Budget that was spent in 2019.

When considering the three Expense categories, the category with the biggest excess spending was Other Salaries by far. Universities overspent on Other Salaries with 23.5% in 2019, amounting to just under R2.5 billion. Thus, Table 7.2 confirms the finding that universities were forced to increase Tuition Fees to fund spending on Other Salaries, a typical fixed cost without a causal relationship to enrolments. What is more concerning is that considering innovation and technological development, Other Salaries is one Expense category that should not have increased, but should have benefited from Economies of Scale as universities improved their efficiency, an efficiency improvement that universities failed to make.

The findings from the descriptive statistics are an outcry that universities are failing in their management of Overhead costs, which should have decreased as technology advanced. Inferential statistical tools were next applied to the results of the financial analysis of the sampled data, confirming the findings from the descriptive statistics discussed. These tools were used in the hypothesis testing in this study. The conclusions from the hypothesis testing are discussed in the following section.

7.3.2. Inferential statistics and Hypothesis testing conclusions

In the daily course of life, people are required to make suggestions regarding situations that are certain, as well as provide guesses where situations are uncertain, together with reasons supporting these suggestions (Walliman, 2011, p. 34). When experiments are conducted, formulating a prediction before starting with the experiment is imperative. Part of the formulation of the prediction is the determination of variables that will be tested, including the steps for measuring and controlling them (Walliman, 2011, p. 11). When the experiment conducted requires the testing of a theory, this theory must be formulated in a statement, referred to as a hypothesis. A hypothesis is a theory that can be proven true or false (Walliman, 2011, p. 19).

The hypotheses tested resulted from the primary objective of this study, which aimed to apply Management and Cost accounting principles to assess the efficiency of South African universities as typical service organisations in a disruptive environment. The hypotheses had three focus areas, i.e. Revenue, Expenses and TIOU growth, specifically the relationship between TIOU growth and the Difference between

Budgeted and Actual Revenue and Expenses. The following hypotheses, with an indication of whether they were accepted or rejected, were tested by applying inferential statistics.

7.3.2.1. Conclusion on Hypothesis 1 (H1) to Hypothesis 8 (H8)

Hypotheses 1 to 8 were tested using one sample *t* tests. In applying these tests, the Nominal TIOU growth for each individual university was used as an Index and converted to 100%. This same growth rate was used in the descriptive statistics as the benchmark for the Budget of a university. The growth of the variable under consideration from 2010 to 2019 was then expressed relative to this Index. Applying the one sample *t* test then meant that the Index (100%) was used as the test value to test the mean of the variable against. The result of each hypothesis tested is discussed below.

$H1_0$: The mean Actual Revenue is not significantly ≤ the mean Budgeted Revenue at 100% TIOU growth.
$H1_a$: The mean Actual Revenue is significantly > the mean Budgeted Revenue at 100% TIOU growth.

$H1_0$ was rejected since there was a significant difference between the mean Actual Revenue of the sampled universities and the test value of 100% (Budgeted benchmark). The mean Actual Revenue is therefore significantly more than the Budgeted Revenue at 100% TIOU growth.

$H2_0$: The mean Actual Tuition Fee Income is not significantly ≤ the mean Budgeted Tuition Fee Income 100% TIOU growth.
$H2_a$: The mean Actual Tuition Fee Income is significantly > the mean Budgeted Tuition Fee Income at 100% TIOU growth.

H2 was included as part of the investigation of the cause of the significant deviation of Actual Revenue from the Budgeted Revenue, as confirmed by H1. Tuition Fee Income grew with 16.12% more than the Index, an increased growth rate that is significant. $H2_0$ was rejected and the mean Actual Tuition Fee Income is therefore significantly more than the mean Budgeted Tuition Fee Income.

$H3_0$: The mean Actual Subsidies and Grants are not significantly ≤ the mean Budgeted Subsidies and Grants at 100% TIOU growth.
$H3_a$: The mean Actual Subsidies and Grants are significantly > the mean Budgeted Subsidies and Grants at 100% TIOU growth.

H3 was also included to determine another potential cause of the significant Difference between Actual and Budgeted Revenue. Subsidies and Grants only grew with 2.93% more than the Index, a difference that is not significant. The lack of significance from the *t* test performed implies the alternative hypothesis $H3_a$ was rejected, and Actual Subsidies and Grants were not significantly more than the Budgeted Subsidies and Grants.

When considering H2 and H3 as part of the investigation into the cause of the significant deviation of the Actual Revenue of universities from the Budgeted Revenue, Tuition Fee Income was the main contributor. This confirms that the growth in Revenue is primarily because of the increase in Tuition Fees above inflation and TIOU growth, an increase that could be justified if universities experienced decreases in funding from the Government. However, Subsidies and Grants increased in line with the growth in TIOUs, with an insignificant difference from the expected Budgeted amount, which means the significant increase in Tuition Fees above the nominal TIOU growth rate was not justified, especially in a country plagued by poverty and a very high unemployment rate like South Africa (Editorial, 2022c, para. 1).

$H4_0$: The mean Actual Expenses are not significantly ≤ the mean Budgeted Expenses at 100% TIOU growth.
$H4_a$: The mean Actual Expenses are significantly > than the mean Budgeted Expenses at 100% TIOU growth.

With H4, the focus of the inferential statistics shifts to the Expenses incurred by universities. When the mean Actual Expenses expressed according to the set Index were tested against a test value of 100%, the difference was not significant. $H4_a$ was, accordingly, rejected and the mean Actual Expenses did not significantly differ from the mean Budgeted Expenses at 100% TIOU growth.

$H5_0$: The mean Actual Expenses are not significantly ≤ the mean Budgeted Expenses at 50% TIOU growth.

$H5_a$: The mean Actual Expenses are significantly > the mean Budgeted Expenses at 50% TIOU growth.

H5 explored how universities managed their Expenses when only 50% of the TIOU growth was considered to derive at the Budgeted benchmark. The result of this test was that Total Expenses grew 15.13% more than the Indexed growth rate when taking 50% of the TIOU growth into account. The significance of the overspending that took place led to the rejection of the $H5_0$, which means that the mean Actual Expenses are significantly more than the mean Budgeted Expenses at 50% TIOU growth.

The Difference between the Actual and Budgeted Expenses using the Nominal TIOU growth rate (50%) was considered for the individual universities included in the sample. The differences amongst the individual universities ranged from -21.3% (-R838 million) to 4.1% (R67 million), indicating that the significant overspending by universities, as confirmed by H5, was not as a result of an external factor affecting the whole higher education industry, but that it was, in fact, the result of the poor management of Expenses within the individual universities. From a Management and Cost accounting perspective, in an environment dominated by fixed costs without a clear input-output relationship to the increase in enrolments, the increase in Expenses in relation to an increase in enrolments should not have been significant. Any significant increase indicates the lack of efficiency with which universities managed their Expenses. The increase in enrolments in this environment of primarily fixed costs should have benefited universities in terms of Economies of Scale.

$H6_0$: The mean Actual Academic Salaries are not significantly ≤ the mean Budgeted Academic Salaries at 50% TIOU growth.

$H6_a$: The mean Actual Academic Salaries are significantly > the mean Budgeted Academic Salaries at 50% TIOU growth.

Actual Academic Salaries is the only Expense category with a direct causal relationship to enrolments. Even though Salaries constitute a fixed cost, a significant increase in enrolments should affect the costs related to enrolments, i.e. Academic Salaries. When H6 was tested, the result of the test was significant. $H6_0$ was rejected, and therefore, the mean Actual Academic Salaries are significantly more than the mean Budgeted Academic Salaries at 50% TIOU growth. However, of the three Expense categories relevant to this sample, Academic Salaries had the lowest overspending, with only 12.22% overspending. The fact that Other Salaries and Other Expenses, both consisting of mainly Indirect costs not related to enrolments, had higher overspending than Academic Salaries, with at least a direct relationship to enrolments, is concerning.

$H7_0$: The mean Actual Other Salaries are not significantly ≤ the mean Budgeted Other Salaries at 50% of TIOU growth.
$H7_a$: The mean Actual Other Salaries are significantly > than the mean Budgeted Other Salaries at 50% of TIOU growth.

As confirmed through the testing of H6, the main cause for the significant overspending taking place at universities was not Academic Salaries, as expected, with a direct causal relationship to the growth in enrolments. H7, therefore, tested how the actual spending on Other Salaries compared to the Budgeted spending. Actual Other Salaries were 22.53% more than the Nominal TIOU growth rate. The finding from testing H7 was a significant Difference between the Actual Growth in Other Salaries and the test value of 100% (see section 6.7.3.). This significance means that $H7_0$ is rejected. The mean Actual Other Salaries are significantly more than the Budgeted Other Salaries at 50% TIOU growth.

$H8_0$: The mean Actual Other Expenses are not significantly ≤ the mean Budgeted Other Expenses at 50% of TIOU growth.
$H8_a$: The mean Actual Other Expenses are significantly > the mean Budgeted Other Expenses at 50% of TIOU growth.

H8 considers how universities managed the third category of the three Expense categories, i.e. Other Expenses. Other Expenses had overspending compared to the Budgeted benchmark of 16.67%, less than Other Salaries, but more than Academic Salaries, reiterating the concern referring to the efficiency with which universities managed their Expenses, characterised by significant increases in fixed costs without a direct causal relationship to enrolments. $H8_0$ was rejected, which indicates that

Actual Other Expenses are significantly more than the Budgeted Other Expenses at 50% TIOU growth.

From the conclusions reached regarding H1 to H8, it is accepted that universities' Actual Expenses were significantly more than their Budgeted Expenses in 2019, using the Indexed growth rate at 50% as a Budget benchmark. A further deduction from the hypothesis testing is that Other Salaries were the biggest contributor to this overspending. Part of the conclusions from the hypothesis testing is that it also seems as if universities funded the overspending incurred by significantly increasing Tuition Fees.

From a Management and Cost accounting perspective, the deductions referring to the hypothesis testing of H1 to H8 can be summarised as a) South African Universities did not manage their Expenses efficiently; and accordingly b) did not benefit from Economies of Scale as is expected in an environment with predominantly fixed costs; c) the inefficiency was primarily related to the increase in Other Salaries; and d) the inefficiency was predominantly funded by the increase in Tuition Fees. The following section explores what the impact of the growth in TIOUs was on the findings explained by testing H1 to H8.

7.3.2.2. Deductions from the hypotheses related to growth (H9 to H11)

The next set of hypotheses (H9 to H11) investigates the impact of growth on the Differences the sampled universities incurred between their Actual and Budgeted Revenue and Expenses. As stated in section 7.3.1., universities in South Africa experienced a large increase in the number of students enrolled. Universities with high fixed costs should therefore have experienced the benefit of Economies of Scale and thus an improvement in the efficiency with which they managed their Expenses. However, from the conclusions reached on H1 to H8, this did not happen. The researcher was therefore obligated to consider the impact of TIOU growth on the efficiency of the cost management at universities in more detail. H9 to H11 were tested by applying regression analysis. The variables used were the Difference for Total Revenue and Total Expenses between Actual and Budget (as determined using the Nominal TIOU growth) and the TIOU growth rate. Regression analyses were used to determine the impact of growth (independent variable) on H9 and H10 as well as the impact of Expenses (independent variable) on Revenue in H11.

$H9_0$: There exists no significant relationship between the growth rate in TIOUs (enrolments) and the mean Budgeted less Actual Total Expenses.
$H9_a$: There exists a significant relationship between the growth rate in TIOUs (enrolments) and the mean Budgeted less Actual Total Expenses.

In the regression analysis performed to test H9, TIOU growth was selected as the independent variable and the Budgeted less Actual Total Expenses as the dependent variable. The regression model for H9 illustrates that the overspending on Total Expenses becomes less negative (decreases) as the growth rate in TIOUs increases with a significant, strong, positive correlation coefficient of 0.726. The opposite is also true. As the growth in TIOUs decreases, the overspending increases (i.e. becomes more negative). From the coefficient of determination, almost 50% of the overspending on Expenses are directly related to the low growth in TIOUs (Adjusted R^2 = 0.494). Considering the disruptions discussed in Chapter 3, these results are concerning, since they demonstrate that the sampled South African universities need TIOU growth to limit their overspending, highlighting the inefficiency of South African universities in managing their Expenses. The significance of the correlation between Budgeted less Actual Total Expenses and the growth in TIOUs rejected $H9_0$ and, therefore, there exists a significant relationship between the growth rate in TIOUs (enrolments) and the mean Budgeted less Actual Total Expenses.

$H10_0$: There exists no significant relationship between the growth rate in TIOUs (enrolments) and the mean Actual less Budgeted Total Revenue.
H10a: There exists a significant relationship between the growth rate in TIOUs (enrolments) and the mean Actual less Budgeted Total Revenue.

When the regression model for H10 was developed, TIOU growth was again considered as the independent variable and the Difference between Actual and Budgeted Revenue was the dependent variable. From the Pearson Correlation coefficient (r = -0.553), there is a strong, negative correlation between TIOU growth and the Difference in Revenue (Actual – Budget). This negative correlation means that as the growth rate decreases, the Difference between the Actual and Budgeted

Revenue increases. With Revenue, a positive difference implies that more was actually received which, from an affordability and efficiency perspective, is negative. From the coefficient of determination (Adjusted R^2), 25.6% of the change in the Difference between Actual and Budgeted Revenue is explained by a change in TIOU growth.

The significance of the correlation between the Difference in the Actual and Budgeted Total Revenue and the TIOU growth leads to the rejection of $H10_0$. The relationship between TIOUs growth, and the mean Actual less Budgeted Total Revenue is therefore significant.

$H11_0$: There exists no significant relationship between Budgeted less Actual Total Expenses and Actual less Budgeted Total Revenue.
$H11_a$: There exists a significant relationship between Budgeted less Actual Total Expenses and Actual less Budgeted Total Revenue.

For the testing of H11, the relationship between the Difference between Budgeted and Actual Expenses and Actual and Budgeted Revenue is considered. This hypothesis was tested using regression analysis with the Revenue difference as the dependent variable and the Expense difference as the independent variable. The variables had a significant, strong, negative correlation. From the regression analysis it was also deduced that 49% of the change in the Revenue difference is caused by a change in the Expense difference. Hence, the correlation stated implicates that the bigger the Difference between Budgeted and Actual Expenses, the more universities increase the Revenue above the Nominal TIOU growth rate. Since Subsidies and Grants grew in line with the TIOUs, this increase could only be done through an increase of Tuition Fees or raising Other Income generated. To simplify this finding, the more the universities overspend, the more their Actual Revenue has to increase. When considering Economies of Scale, in an environment dominated by fixed costs, the more outputs (enrolments) increase, the less the cost per unit should be. This means that as Revenue increased, Expenses, at the very least, should have remained the same. The findings from testing H11 indicate the opposite, namely that, as Expenses increased, universities chose to increase their Revenue by increasing their Tuition Fees, not the other way around (i.e. Expenses increased as Revenue increased). The significance of the correlation also means that $H11_0$ was rejected, as well as that there exists a significant relationship between Budgeted less Actual Total Expenses and the Actual less Budgeted Total Revenue.

The findings from testing the impact of TIOU growth on Revenue and Expenses are, a) Actual Total Expenses above Budget were the highest where TIOUs grew the least; b) Actual Total Revenue above the Budget were the highest where TIOUs grew the least; and c) the more Actual Total Expenses exceeded the Budget, the more Actual Total Revenue had to increase. Table 7.3 summarises the outcomes of the hypothesis testing performed in this study.

Table 7.3: Study hypothesis confirmation table

Number	Hypothesis	Not Rejected/Rejected
$H1_0$	The mean Actual Revenue is not significantly ≤ the mean Budgeted Revenue at 100% TIOU growth.	Rejected
$H1_a$	The mean Actual Revenue is significantly > the mean Budgeted Revenue at 100% TIOU growth	Not Rejected
$H2_0$	The mean Actual Tuition Fee Income is not significantly ≤ the mean Budgeted Tuition Fee Income 100% TIOU growth.	Rejected
$H2_a$	The mean Actual Tuition Fee Income is significantly > the mean Budgeted Tuition Fee Income at 100% TIOU growth.	Not Rejected
$H3_0$	The mean Actual Subsidies and Grants are not significantly ≤ the mean Budgeted Subsidies and Grants at 100% TIOU growth.	Not Rejected
$H3_a$	The mean Actual Subsidies and Grants are significantly > the mean Budgeted Subsidies and Grants at 100% TIOU growth.	Rejected
$H4_0$	The mean Actual Expenses are not significantly ≤ the mean Budgeted Expenses at 100% TIOU growth.	Not Rejected
$H4_a$	The mean Actual Expenses are significantly > than the mean Budgeted Expenses at 100% TIOU growth.	Rejected
$H5_0$	The mean Actual Expenses are not significantly ≤ the mean Budgeted Expenses at 50% TIOU growth.	Rejected
$H5_a$	The mean Actual Expenses are significantly > the mean Budgeted Expenses at 50% TIOU growth.	Not Rejected
$H6_0$	The mean Actual Academic Salaries are not significantly ≤ the mean Budgeted Academic Salaries at 50% TIOU growth.	Rejected
$H6_a$	The mean Actual Academic Salaries are significantly > the mean Budgeted Academic Salaries at 50% TIOU growth.	Not Rejected
$H7_0$	The mean Actual Other Salaries are not significantly ≤ the mean Budgeted Other Salaries at 50% of TIOU growth.	Rejected

Number	Hypothesis	Not Rejected/Rejected
$H7_a$	The mean Actual Other Salaries are significantly > than the mean Budgeted Other Salaries at 50% of TIOU growth.	Not Rejected
$H8_0$	The mean Actual Other Expenses are not significantly ≤ the mean Budgeted Other Expenses at 50% of TIOU growth.	Rejected
$H8_a$	The mean Actual Other Expenses are significantly > the mean Budgeted Other Expenses at 50% of TIOU growth.	Not Rejected
$H9_0$	There exists no significant relationship between the growth rate in TIOUs (enrolments) and the mean Budgeted less Actual Total Expenses.	Rejected
$H9_a$	There exists a significant relationship between the growth rate in TIOUs (enrolments) and the mean Budgeted less Actual Total Expenses.	Not Rejected
$H10_0$	There exists no significant relationship between the growth rate in TIOUs (enrolments) and the mean Actual less Budgeted Total Revenue.	Rejected
$H10_a$	There exists a significant relationship between the growth rate in TIOUs (enrolments) and the mean Actual less Budgeted Total Revenue.	Not Rejected
$H11_0$	There exists no significant relationship between Budgeted less Actual Total Expenses and Actual less Budgeted Total Revenue.	Rejected
$H11_a$	There exists a significant relationship between Budgeted less Actual Total Expenses and Actual less Budgeted Total Revenue.	Not Rejected

When considering the summarised deductions from the hypothesis testing presented in Table 7.3, all null hypotheses except for $H3_0$ and $H4_0$ were rejected. This is a finding worth highlighting, since it emphasises that universities' Subsidies and Grants grew in relation to the Nominal TIOU growth rate, which means that the excessive growth of Revenue is because of either Tuition Fee increases, or Other Income. However, Other Income contributes the smallest percentage to Total Revenue, which leaves Tuition Fees as the primary Revenue stream available to explain the Revenue growth.

The forecast for universities is concerning. This concern stems from Tuition Fee Income, which was the biggest reason for the Difference between Actual and Budgeted Revenue. The increase in Tuition Fees was driven by the growth of Expenses that was significantly above the Nominal TIOU growth rate. When considering that Other Salaries were the Expense category that had the biggest growth above the Index based on Nominal TIOU growth, universities seem obliged to increase Tuition Fees to fund Expenses not related to enrolments. What is further concerning is that overspending on Expenses and the over-receipt of Revenue increased when growth slowed down. Traditional universities are faced with the very real possibility that in the future, due to the severity of the disruption globally in the higher education industry, enrolments will decline. If enrolments decline, what will happen to Tuition Fees if Expense growth continues to exceed TIOU growth? Will universities be able to meet the needs of students for affordable education that ensures employability? The next section provides recommendations formulated from the findings of this study.

7.4. Summary of recommendations

The main objective of this study was to apply Management and Cost accounting principles to assess the efficiency of South African universities as typical service organisations in a disruptive environment. This section provides the recommendations emanating from the literature reviewed in this study and the empirical testing performed.

1. The first recommendation is that from the perspective of an increase in service organisations and the changing cost structure of organisations, both the research and literature focusing on how to effectively apply Management and Cost accounting in a fixed and Indirect cost environment should escalate. Chapter 2 expanded on the changing business environment with a shift from manufacturing to services that took place (Editorial, 2020e, para. 1, 2020c, para. 1). The development of Management and Cost accounting did not keep pace with the changes in the business environment, since costing systems were initially developed for the costing of goods and might not be completely applicable in the costing of services (Lowry, 1990, pp. 159, 176; Terzioglu and Chan, 2013, p. 30). Together with the increase in the number and size of service organisations, the cost structure of organisations also shifted from predominantly variable costs to most costs being fixed. These fixed costs are also mostly Indirect, without a causal relationship with the outputs produced by an organisation (Cooper and Kaplan, 1988; Smit, 1989; Tolsma, 1996, pp. 8–9; Hojna, 2013, p. 64; Bazrafshan and Karamshahi, 2017, p. 164). Where there is an absence of a direct or causal input-output relationship, as in most service organisations, the application of conventional Management and Cost accounting tools are limited, since these tools were predominantly designed

to manage direct and variable costs (Serfontein, 2019, p. 11; Cooper and Kaplan, 1988; Smit, 1989; Tolsma, 1996, pp. 8–9; Hojna, 2013, p. 64; Adum, 2015, pp. 1889–1890; Bazrafshan and Karamshahi, 2017, p. 164). However, section 2.8. explored modern Management and Cost accounting tools that could aide universities in managing their fixed and Indirect costs more efficiently. Some of the tools discussed that are recommended to be used more widely at universities are ABC and ABM where the activities performed at universities are listed, considered for relevance, and then determined what the actual costs associated with these activities are to determine where there are opportunities for cost decreases. Target costing could also provide guidance to universities where a reasonable Tuition fee could be established and the maximum costs that universities can incur be determined, providing the justification for a serious cost-cutting movement at these organisations.

From both an organisational management and higher education point of view, more research studies and the writing of textbooks should focus on applying Management and Cost accounting in a service organisation, especially with the majority of costs incurred without a direct input-output relationship. This is especially critical when considering the education of Accounting students. One of the main functions of Management and Cost accounting is to provide relevant, accurate information to assist in the decision-making process (Drury, 2018, p. 16) . This function is complicated when service organisations with a predominantly fixed cost environment is considered, an area that requires attention to ensure the relevance of students educated in Management and Cost accounting, since the Accounting environment is shifting from purely technical knowledge towards interpreting the results of various technical calculations, emphasising decision-making (Islam, 2017; Jackson, Michelson and Munir, 2020, p. 6).

2. The second recommendation relates to the first recommendation to make a serious attempt to update literature with guidance on the strategy to reduce costs in a disruptive environment without a clear input-output relationship. From the disruption universities face as described in Chapter 3, decision-making is unavoidable for universities. Universities are facing severe disruption in the form of the 4IR and the

looming 5IR. The accelerated move to online (or blended) learning brought on by the COVID-19 pandemic removed the competitive advantage of geographical location of traditional universities, since in the future, students could have direct online access to the best universities in the world. The prediction by Harvard professor Clayton Christensen is becoming a reality. He stated in 2017 already that half of the 4 000 US colleges and universities would be bankrupt in 10 to 15 years (thus five to ten years from now) as a result of technological disruption (Hess, 2017, para. 1; Smit and Serfontein, 2020, para. 4). In the UK, the after-effects of COVID-19 could be detrimental to universities. This prediction is proving true, since 18 000 students in England, Wales and Northern Ireland had withdrawn from university courses by February 2022 (Adams, 2020, paras 1–2, 2022, para. 1). The response of universities to this prediction is no easy task. The reason for the difficulty for universities to respond to the financial crisis they are facing is the cost structure of universities. This cost structure consists primarily of fixed costs that are salary related. These costs do not decrease instantly, even if universities embark on a serious cost-cutting exercise. A further risk is that, should enrolments decrease, the costs incurred at universities (fixed salary costs) will not decrease at the same rate, an instant recipe for considerable losses. It might be argued by critics that Africa, and specifically South Africa, is possibly lagging behind regarding this phenomenon. Although the author is of the opinion that this is not the case, the research question to be asked is not if it happens, but when it will happen.

From a Management and Cost accounting perspective, literature does not provide any solutions to solve this ‘stickiness’ of the costs of universities. Typically, Salaries cannot be cut in the short to medium term, because of the strict labour laws in South Africa protecting employees from being instantly dismissed. Universities need considerable guidance on how to benefit from Economies of Scale and manage their fixed costs more efficiently, since reducing costs at a university is not a quick process. Universities should take a serious look at all Expenditure not directly related to teaching and research (Indirect for the purpose of this study) and consider where they can reduce these costs (input) without reducing the number of enrolments (output). One measure that could assist with this reduction is moving away from simply preparing new Budgets based on an incremental increase of the previous period costs toward a ZBB approach where each Expense item must be justified before it is approved as part of the Budget. Included in this suggested change in Budgeting method is a more extensive application of Responsibility accounting where employees are held responsible for the costs they can impact, resulting in the related employees only being authorised to make decisions that impact these costs. Regarding specifically overheads (top management, service and support departments), Smit (1989, p. 419) suggests the following actions to improve efficiency and control, namely: a) a service could only be judged according to the results or outputs it provides, b) for every service there must be persons that benefit to the advantage of the whole organisation, c) the cost of the service must be in relation to the benefits received, and d) the benefits or value of a service could best be judged by the user of the service.

If universities continue on this road of inefficient management of costs, they will not be able to address the needs of students for affordable education that will ensure employability. The outcry for affordability and employability from South African students are critical. In South Africa, the unemployment rate “improved” in the second quarter of 2022 to a staggering 33.9% (Staff writer, 2022b, para. 2). This unemployment rate is contextualised by the inequality of the distribution of Income. South Africa is known as one of the most unequal countries in the world from the perspective of the distribution of Income, with a Gini coefficient (last measured in 2014) of 63%. The Gini coefficient implies that in South Africa, the richest 10% owns 71% of the wealth, with the poorest 60% holding only 7% of the wealth (Editorial, 2022a, para. 4). Providing affordable education entails that universities cannot continue increasing Tuition Fees to fund the inefficiency with which costs are managed, thus depriving the poor from accessing higher education. When employability is considered, it is crucial that universities benefit from Economies of Scale to avail funds that can be invested in developing programmes according to the requirements of the modern business environment to ensure employability.

3. When efficiency is investigated, the findings from the empirical part of this study concluded that universities increased their Tuition Fees to fund the significant increase in primarily Other Salaries (see section 7.3.2.), a cost without a direct causal relationship to enrolments. The next recommendation is therefore that

universities should engage in an active effort to manage their Indirect costs more efficiently. This efficient management of Indirect costs entails that universities address a few challenges related to Indirect costs. These challenges were discussed in detail in section 2.7.1. These challenges are, according to Smit (1989, p. 208–220), the increase in Overhead (top management, service and support) costs in big companies and the inability of Management and Cost accounting, due to the indirect and fixed nature of these costs, to address the problem. Part of the recommendation for improved management of Indirect costs at universities is that the following challenges must be addressed to enable universities to manage their Expenses more efficiently:

a) **The productivity of Overhead-related activities is not easily measured**. This problem is even more severe, since service and support personnel are typically in cost centres with no effective way to measure productivity or relate it to the outputs of the organisation.
b) **The lack of goal congruence between the main objective of the organisation as a whole and the objectives of services**. Service departments should prove they are useful to the organisation. This is often accomplished by taking on tasks that could easily have been outsourced, leading to the generation of work for the related service department that the organisation does not necessarily need.
c) **Levels of management**. Levels of management increase because of decentralisation. Consequently, a service department is often created at head office and in the decentralised unit (like an accounting department). Organisations sometimes create a new department in reaction to a problem that needs to be solved. Once the problem is solved, the newly created management level remains, since organisations are often hesitant to phase out this management level for fear of causing frustration or that it could lead to retrenching certain staff specialists.
d) **The underutilisation of expensive equipment.**
e) **Fast-growing organisations often experience Overhead-related problems because of growth due to the lack of cost-consciousness**. When the demand for output increases, organisations increase Overheads in the form of

more services and facilities, which in itself is not a problem, but becomes a problem when sales and accordingly output starts decreasing.

f) **A move towards a more bureaucratic management style**. Bureaucracies have as a main disadvantage very formal organisational structures; however, more emphasis is placed on support and staff functions to keep these structures in place. This, accordingly, provides more decision-making power to existing centralised functions (such as finance and planning), increasing the number of personnel required in these departments.
g) **The inability of accounting systems to accommodate Overheads sensibly also leads to increases in these costs.**
h) **Top management's attitude towards Overheads**. Various Overhead activities are poorly managed because these functions are often the favourites of top management.

If universities can address the mentioned challenges in the management of Overhead costs, there is a possibility that universities can manage their costs more efficiently, even benefiting from Economies of Scale. Unfortunately, addressing these challenges will require substantial strategic decisions by Top Management. This improved efficiency could address the increases in Tuition Fees and avail resources to make the required changes to address the employability of graduates.

4. The next recommendation is that any of the findings and recommendations in this study are applicable to any service organisations. The findings and recommendations can benefit specifically municipalities and regional and national government agencies.

5. The final recommendation from this study relates to the dependency of universities on enrolment growth as confirmed through the testing of Hypotheses 9 and 10 (H9-H10) (see section 7.3.2.). Universities were dependent on the growth of enrolments (through TIUs and TOUs) to ensure that they manage the over-receipt of Revenue and, in turn, the overspending of Expenses. If the prediction of the severity of the consequences of the disruption as discussed in Chapter 3 happens and enrolments start to decline, the outlook for traditional universities is concerning. In an environment with ‘sticky’ fixed costs without a direct relationship to outputs, a decline

in enrolments will have a severely negative impact on the financial results of universities. From the regression analysis performed to test H9 (section 6.8.) depicted in Graph 6.1 (see section 6.8.) is deducted that for universities to incur no overspending (i.e. Actual Expenses = Budgeted Expenses), TIOUs must grow with at least 3.6% annually, a growth rate that seems highly unlikely, considering the disruption universities globally face. A more likely scenario is zero or negative TIOU growth. When TIOU growth is zero, universities spend 15.5% more than the Budgeted benchmark as determined by the Nominal TIOU growth rate. When TIOUs decline with 4.0%, this overspending increases to 32.6%. These results should not occur in an environment with predominantly fixed costs, since universities should have benefited from Economies of Scale. Universities can no longer afford not to assert every possible method to manage their Expenses more efficiently.

7.5. Contribution of study to the field of Management and Cost accounting

This study addressed the gap in theory surrounding the application of Management and Cost accounting in South African universities as a typical service organisation. It also went a step further and looked at how Management and Cost accounting principles can assist South African universities in addressing the challenges they are facing and regain their relevance by freeing up resources to make the required leap, both in capital investment and staff training, to a blended learning approach. Without this change in the business model of traditional universities, the available global open-source education may cause the downfall of traditional universities.

This study applied Management and Cost accounting to determine the efficiency with which universities, as typical service organisations offering a diversity of services, managed their Expenses. Hence, Chapter 2 of this study highlighted the challenges surrounding the application of Management and Cost accounting in service organisations.

The literature reviewed in this study's contribution to the field of Management and Cost accounting is based on two focus areas. Firstly, the application of Management and Cost accounting in the service sector was explored. Then the search was narrowed to include universities as service organisations' application of Management and Cost accounting.

When considering the application of Management and Cost accounting in service organisations, the body of knowledge on the application of Management and Cost accounting remains limited, despite the growth experienced in the service industry (Terzioglu and Chan, 2013, p. 29; Mohr, 2017, p. 91). The findings from the review of literature in Chapter 4 contributed to the body of knowledge regarding the application of Management and Cost accounting in universities. This contribution firstly is an in-depth exploration of the cost structure of universities, consisting of primarily fixed cost. The investigation of this cost structure further includes a contribution to understanding the costs associated with a module based on the behaviour of costs. Since most costs incurred at universities relate to personnel costs, the biggest portion of the costs incurred by universities is fixed. However, the fixed nature of the costs at universities poses a risk since a decrease in funding could have a significant impact on the financial position of the university. In contrast, any increase in marginal Income does not necessarily necessitate additional capital outlay (Agyemang and Broadbent, 2015, p. 1029). A further classification of the costs incurred at universities is that the intangibility of the cost objective makes most costs incurred Indirect. This study contributed to managing the risk associated with the large portion of fixed costs present at universities (and service organisations in general) by exploring the nature and severity of the risk and applying correlation and regression analysis to determine what impact a decrease in enrolments could possibly have on the Expenses and Income of universities. This study also enhanced the literature available surrounding the management of Indirect costs at service organisations and universities specifically by investigating the possible reasons for overspending by these organisations on this cost category.

This study's contribution to practice considers the Income and Expenditure at universities and the correlations between these line-items and enrolments. When considering the largest cost incurred at universities, i.e. Salaries, the characteristics of specifically Academic Salaries comply with the 'period cost' of the definition of fixed costs, but not necessarily to the 'no direct link to outputs' (see section 2.3.2.). Typically, academic faculties and departments are treated as Profit centres, implying that their funding depends predominantly on the number of student enrolments in their degrees and modules presented, as well as research outputs (Serfontein and Smit, 2021, p. 176). In contrast, most service and support departments are regarded as discretionary Cost centres (refer to section 2.9.1.) and the costs they incur are classified as Overhead costs. These departments' funding is not related to a measurable output or performance. A further problem associated with Overheads is that these costs are often allocated to Profit centres, implying that Overhead costs are typically allocated away from their place of control. In the same way, to be effective, conventional Budgeting requires a clear input-output relationship that does not exist with Overhead related costs.

These deductions referring to most of the costs incurred at a university complicate the management of these costs. However, the management becomes easier when the behaviour of costs and Income at universities is understood. This is a further substantial contribution of this study to the available body of knowledge related to Cost and Management accounting and universities. This study found that a) presenting a module, whether existing or new, is a fixed cost, irrespective of the number of enrolments; b) there is a variable cost component that is influenced by the number of enrolments per module; c) academic staff have limited capacity to present modules; hence, the decision to add modules in a department impacts the staff's capacity; and d) focusing on the financial viability of universities, it is important to understand input-output relationships, which form the basis of efficiency in any organisation. It is clear from the behaviour of the biggest portion of the costs incurred by universities that an increase in student numbers as discussed in section 4.5. should not increase the biggest portion of costs and accordingly cause an increase in the fees charged by universities. Universities should have benefited from the increase in student numbers, but this does not seem to be the case. It appears that universities did not benefit from Economies of Scale.

The only way to improve efficiency in an organisation is to improve the input-output relationship of that organisation, thus rendering the service at a more affordable price. This improved input-output relationship implies saving costs to deliver the service.

When considering academic faculties and departments as Profit centres with a clear input-output relationship, the application of Management and Cost accounting tools could be used to improve efficiency (Saladrigues and Tena, 2017, p. 118; Sorros *et al.*, 2017, p. 310).

The findings from the empirical testing performed in this study also contribute to the body of knowledge regarding the behaviour of the Revenue and Expenses at universities specifically related to the growth in TIOUs. These findings aid in understanding the input-output relationship between enrolments (TIOUs) and Revenue and Expenses. This understanding is critical for universities to improve their efficiency.

The contribution of this study stretches further than just universities. The study found that universities overspent on various Expense categories, but the biggest overspending took place in Indirect cost without an input-output relationship to enrolments and this overspending resulted in Revenue increases above what was reasonably expected (TIOU growth and inflation). This emphasises the deduction that, as growth declines, the overspending and significant fee increases just escalate, which are equally applicable to all service organisations. These findings are even more appropriate where an organisation receives funding from government, as is the case with municipalities and regional and national government agencies. The problem is that research referring to Management and Cost accounting tools to assist service organisations to manage their costs more efficiently is lacking; a lack that this study endeavoured to address and to fill the gap.

7.6. Study limitations

In Chapter 1, the main limitation to this study was that the data used are very sensitive. The sensitivity of the data made the protection of the identity of the individual universities very important. Unfortunately, the requirement of anonymity limited the depth of the analysis of the efficiency of individual universities. During the execution of the study, a few additional limitations occurred.

The first limitation encountered while performing the study was regarding the availability of the data. Although the universities forming the population of the sample selected are all publicly funded, not all Financial Statements for all universities for the three years considered (2010, 2015 and 2019) were published. This limited the size of the sample. Fortunately, as discussed in section 5.6.3., the sample was still big enough to be considered a representation of the population.

Another limitation was that the Statement of Financial Position was not analysed, since this analysis fell outside the scope of this study. The evaluation of efficiency would not necessarily change with the analysis of the Statement of Financial Position, but this analysis could provide valuable insight and will be considered for future research. A detailed analysis of the Net Surplus was also not done. This was an intentional decision because the primary focus of the study was on Expenses and Revenue.

This study referred to the need of South African students for affordable, relevant education that will ensure employability. This research was limited to analysing the financial efficiency of universities and therefore cannot necessarily comment on the employability of graduates. This limitation provides a base for future research.

A further limitation to note is that the findings from the study were conclusive on the inefficiency of the management of the Expenses of the universities in the sample and that the main contributor related to Overhead costs. However, investigating the possible causes why Indirect costs were managed inefficiently falls outside the scope of this study. The top management of universities will most probably attempt to justify the relative increase in Overhead-related activities, but the focus of this research was on efficiency from a financial management point of view.

Using TIOUs as a proxy for enrolment growth might not be the perfect tool, but TIOUs were used consistently. It is also the opinion of the researcher that there does not exist a ‘perfect’ measure for growth at universities and the TIOU growth is the best proxy available.

The final limitation was discussed in more detail in section 5.7. This limitation related to the data that were used. The Financial Statement data for the sampled universities were analysed in this study. Relying on the data reported in the Financial Statements implies that the researcher was limited to the level of detail reported in the related statements. A further limitation focusing on this data is that the study did not consider the comparability of the data, since several assumptions are made when Financial Statements are prepared. However, these statements are, according to law, prepared based on IFRS that relies on a framework which supports comparability of Financial Statements within an organisation over different financial years as well as between organisations within the same industry.

Some of the limitations discussed in this section provide an opportunity for future research. The following section describes the future research opportunities that could emanate from this study.

7.7. Future research suggestions

The first opportunity for future research entails a duplication of the current study, expanded to include a bigger sample. This bigger sample could also extend to other countries in Africa and other continents.

Further research suggestions stem from the limitations in the previous section. One option is to analyse the financial data contained in the Statement of Financial Position to determine the impact these figures have on the evaluation of the efficiency with which Revenue and Expenses at universities are managed.

The data from individual universities could be assessed in more detail. This detailed analysis of the data of individual universities could also include investigating possible causes for significant increases in Indirect costs as were part of the findings of this study.

To address the limitation regarding the employability of graduates, a future research opportunity exists for a detailed analysis of the growth in TIOUs (thus, did the universities enrol students in disciplines that would ensure employability or simply to increase student numbers?). The various sciences experiencing growth can be analysed to enable a comparison to the research surrounding the 4IR and the skills required from graduates to navigate the changing business environment.

This study was also only performed up to and including 2019. This choice was specifically made to ensure that the disruption caused by COVID-19 did not distort the findings of this study. There is, however, an opportunity to analyse the impact of COVID-19 on the financial results of universities and to compare these findings to the findings from this study representing the pre-COVID-19 period. The financial results post-COVID-19 provide a further opportunity to determine whether universities returned to the pre-COVID-19 status quo or if they adapted to the new environment brought about by the pandemic and the resulting expediting of the 4IR. The focus area in this study was universities, but the researcher is convinced that similar problems exist in all service organisations.

7.8. Summary

Globally, various industries such as travel, services, government, entertainment, publication, and retail have benefited from technology and the internet to improve their efficiency. Universities, however, are one industry not yet fully capitalising on the benefits of technology and an online platform (Pathak and Palvia, 2021, pp. 36–37). Instead, the internet and technological developments had a negative impact on traditional universities, which caused them to lose their competitive advantage of geographical location. The cost of education is also no longer a competitive advantage, since government funding of universities in South Africa is on the decline (Editorial, 2020f, para. 8).

Added to the inability of universities to capitalise on efficiency brought about by technological developments is the COVID-19 pandemic, expediting the 4IR, which impacted the relevance of both 'What' and 'How' universities teach. Universities should adapt or face the consequences. From the findings in this study, traditional universities in South Africa have experienced substantial increases in enrolments over the last few decades. In an environment with mostly fixed costs without a direct causal relationship with enrolment growth, universities should have benefited from **Economies of Scale**, managing their Expenses more **efficiently** to increase their outputs without necessarily increasing inputs. However, this does not seem to be the case, with universities increasing their spending significantly above Nominal TIOU growth.

In summary, from a Financial Management perspective, South African universities should have been able to save on Expenses, benefiting from technology, efficiency, and Economies of Scale. In contrast, university Expenses grew faster than both inflation and TIOU growth. The failure of South African universities to benefit from Economies of Scale and managing Expenses efficiently is a negative reflection on Management and Cost accounting for not adapting to costing conditions of the service industry. In the absence of predominantly variable cost with a direct relationship to outputs, Management and Cost accounting has lost its relevance to manage fixed costs in an environment with no causal relationship to output. At the same time, it seems as if top management at South African universities used (abused) this situation to increase service and support departments, as well top management posts. Possible deductions from this phenomenon are:

- In times of rapid change led by the 4IR and accelerated by COVID-19, academic staff needs to adapt to the new skills needed by students as well as how it is presented; yet South African universities spent most of their money on increasing Other Salaries rather than expanding academic staff.
- Applying what Smit (1989) already deduced in the 1980s about the reasons why Overhead costs in service organisations increase and applying it to universities, it is the opinion of the author that top management at universities, combined with the service and support functions (which they control), do not focus on rendering a better service to academic staff but turned the management in service and support functions into line managers, and in doing so, increased the administrative burden of academic staff.
- Whether it is ignorance or intentional, the top management of South African universities failed to provide affordable education that will ensure employability.
- The increase in Tuition Fees, specifically in a country with poverty, unemployment, and Income inequality, provides a very negative perception about the intentions of the top management of South African universities. If affordability were supposed to be one of the top priorities of top management to provide equal access to all students, rich and poor, to a better life, it would seem as if top management, be it ignorance or intentional, were driving their own priorities.

- Almost the most concerning issue is that South African universities used growth in enrolments to balance their rapidly increasing Expenses and the question could be asked, what would happen if student numbers started to decline in this disruptive environment?

The findings in this study paint a concerning picture. It is the opinion of the author that the potential disruption in higher education, moving from face-to-face to online classes, could seriously impact the financial viability amongst South African universities, given their dependence on enrolment growth and increases in Tuition Fees to fund the growth in Expenses. Professor Stephen Parker (2020, p. 1), Global Lead, Education and Skills for KPMG international and Special Adviser on Education for KPMG Australia, summarises the predicament of traditional universities by stating:

> *"Traditional universities are approaching a crossroads. They must decide whether to transform themselves into new kinds of entities, optimise their existing operations in a search for further efficiencies and increased capability, do nothing in the hope that if no rescue appears they will have time to decide what to do later, or do nothing in the belief that they are invulnerable."*

The last two options in an environment of disruption are the worst. According to Charles Darwin's *Theory of Evolution,* as published in his book, *On the Origin of species,* the plants and animals that adapted the best to their environment were the only ones able to survive and reproduce, leading to the modern phrase of "adapt or die" (Jackson, 2015, p. 4; Editorial, 2018b, para. 2). If universities choose to "*do nothing*" as stated in the quote by Professor Stephen Parker and not adapt, they will not survive. Over the last few decades, organisations worldwide have failed in so many industries where technology led to major disruption.

H9 to H11 tested in this study confirmed that South African universities need enrolment growth to afford the abnormal increase in Expenses at these organisations. Given the fixed and Indirect nature of most of university Expenses, the research questions to be answered is, what would happen if enrolments started to decline because of factors such as online teaching becoming the norm, or more affordable and relevant education becoming available? Add the fact that Salaries represent the major Expense at South

African universities in a country with of the strictest labour laws in the world, how long would it take these universities to become financially viable again? Disruption in terms of declining student numbers is already escalating at traditional universities globally (Parker, 2020, p. 9; Adams, 2022, para. 1). In contrast to a potentially rapid decline in Revenue accompanying the decline in student numbers, Expenses could take years to decrease, especially in typical service organisations such as universities dominated by fixed costs.

Daniel Keys Moran, an American computer programmer and science fiction writer states, "*You can have data without information, but you cannot have information without data*" (Editorial, 2019b, para. 2). Ultimately, this study provided data that can be used as information for universities to enable them through the application of Management and Cost accounting tools to make the right decisions at the crossroads they are facing in order to improve their cost efficiency and ensure their financial survival.

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Appendix – Ethics Approval

GENERAL/HUMAN RESEARCH ETHICS COMMITTEE (GHREC)

17-Nov-2021

Dear Mrs Carla Serfontein

Application Approved

Research Project Title:
Cost efficiency at South African universities

Ethical Clearance number:
UFS-HSD2021/1793/21

We are pleased to inform you that your application for ethical clearance has been approved. Your ethical clearance is valid for twelve (12) months from the date of issue. We request that any changes that may take place during the course of your study/research project be submitted to the ethics office to ensure ethical transparency. furthermore, you are requested to submit the final report of your study/research project to the ethics office. Should you require more time to complete this research, please apply for an extension. Thank you for submitting your proposal for ethical clearance; we wish you the best of luck and success with your research.

Yours sincerely

Dr Adri Du Plessis
Chairperson: General/Human Research Ethics Committee

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