UNIVERSITY OF LUSAKA

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ADEQUACY OF PRIVATE OCCUPATION PENSION SCHEMES BENEFITS: A CASE STUDY OF ATLAS COPCO PENSION TRUST SCHEME

A DISSERTATION SUBMITTED TO THE SCHOOL OF POSTGRADUATE STUDIES, UNIVERSITY OF LUSAKA IN PARTIAL FULFILLMENT OF THE AWARD OF THE MASTER OF SCIENCE IN ACTUARIAL SCIENCE

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DECLARATION

I, Maureen Nguvulu do hereby declare that this dissertation is my original work and has not been presented for a Master's degree at any other university and that all the sources I have used or quoted have been indicated and acknowledged by complete reference.

Maureen Nguvulu Signature……

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Dr. Taonaziso Chowa Signature……

Date……

DEDICATION

This is entirely dedicated to my daughter and son, Nambisa and Yamikani Mushani.

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LIST OF ACRONYMS

ILO	International Labour Organisation
LASF	Local Authorities Superannuation Fund
PSPF	Public Service Pensions Fund
NPS	National Pension Scheme
NAPSA	National Pension Scheme Authority
OECD	Organisation for Economic Development
IRR	Income Replacement Rate
PIA	Pensions and Insurance Authority
DB	Defined Benefit
DC	Defined Contribution
ZNPF	Zambia National Provident Fund
CDC	Collective Defined Contribution
IAS	International Accounting Standards
GRR	Gross Replacement Rates of Earnings
CORE	Comprehensive Replacement rate
LDCs	Less Developed Countries
LCH	Life-Cycle Hypothesis
NRA	Normal Retirement Age

ABSTRACT

As the global population ages, the importance of robust and effective pension schemes becomes increasingly pronounced, especially in developing economies like Zambia. The adequacy of pension systems is a crucial determinant of the financial security and well-being of retirees, influencing their quality of life during post-employment years. Against the backdrop of economic, demographic, and social changes, this dissertation comprehensively evaluated the adequacy of pension schemes in Zambia, in the case of one private company. The study aimed to afford an understanding of the current status of pension provisions in the country by assessing and evaluating the adequacy of benefits provided by private occupational pension schemes in Zambia in meeting the retirement needs of employees. A quantitative approach was adopted, considering the data recorded by the pension scheme since its inception, in which the adequacy of the pension system was assessed. The quantitative information was gathered from the membership data and analysed using a Spreadsheet Pension Fund valuation model in Microsoft Excel 2016, and a model was designed taking into account key pension adequacy indicators. According to global best practice, a target of income replacement rate of 65%-85% guarantees a decent standard of living to employees in retirement, especially in low-income regions such as Southern Africa. The findings attained from the analysis of the expected replacement rates for the current scheme members based on the current contribution rates showed that the pension scheme provide low levels of benefits to the pensioners. However, increasing the contribution rates would result in the improved targeted retirement benefits from the Fund. A total contribution rate of 25% was required taking into account inflation, in order for the Pension Scheme alone to achieve the target benefits of 65% – 85% replacement rate.

Keywords: **Pension Scheme, Benefits, Income Replacement Rate**

CHAPTER ONE: INTRODUCTION

1.1 Introduction and background

In the rapidly evolving landscape of retirement planning and pension provision, occupational pension schemes are crucial in providing financial security and retirement benefits for employees in Zambia. This is due to the fact that planning for retirement income is a major concern for many retirees given the rapidly aging working population and the likelihood that Social Security faces financial insolvency. The International Labor Organization (ILO) guidelines assert that social protection benefits must ensure, at the very least, convenient access to essential healthcare and fundamental income security as specified at the national level (ILO, 2017). Moreover, global standards recognize that while the state is entitled to determine the adequacy of benefits, it should consider the population's requirements, financial and operational capabilities, and, at a minimum, ensure protection against social exclusion, vulnerability and poverty, and, enabling a life filled with dignity and health (Isaka et al., 2019). The primary obstacle confronting social security systems in developing nations revolves around finding sustainable means to finance and ensure the sufficiency of benefits. Achieving financial security in retirement is a crucial objective for participants in occupational pension plans as well as policymakers, as a big retirement cohort's financial instability can impose a significant financial burden on society (Mustafa, Artan, 2021). These schemes are essential components of the overall compensation packages offered by employers. In Zambia, employees contribute to the mandatory public pension fund, the National Pension Scheme (NPS) which is run by the National Pension Scheme Authority (NAPSA) as well as the occupational pension schemes (non-mandatory). However, as Zambia faces the challenges that come with demographic shifts, economic uncertainties, and the changing nature of retirement needs, the question of whether these occupational pension schemes are effectively meeting their intended objectives has become increasingly pertinent.

Like in other countries in Africa, retirees in Zambia are susceptible to old-age poverty. The battle against poverty among the elderly has been worsened by the COVID-19 pandemic, mainly attributable to anticipated diminished returns from investments.

According to Feher and de Bidegain (2020), the performance of plan asset was affected by the pandemic, leading to decreased yields. With Zambia already battling adequacy issues, the effects of the COVID-19 pandemic on the turnout of investments has affected the pension benefits received by the retirees which in turn has worsened the old-age poverty (Yohane et al., 2022).

To determine how well the pension schemes in Zambia perform, the first thing to determine is what a good and adequate pension system constitutes of. There has been an ongoing debate as to what a pension system must fulfil to attain its objective. Some consensus has been reached across international organisations, based on the 2001 Laeken Agreement, which the European Council signed, the three general aims of a pension system must be fulfilled, that is: pension adequacy, financial sustainability of the pension systems, as well as the modernization of pension systems in to meet the evolving needs. On the other hand, the World Bank declare affordability, sustainability, adequacy, and robustness in the event of significant shocks as primary objectives of pension systems o (Holzmann et al., 2008). The Organisation for Economic Development (OECD), another main participant in pension policy, lists; pension adequacy, financial sustainability, efficiency in administration, a broad coverage, provision of work incentives, and diversification of retirement savings as the key objectives of pension systems (OECD, 2012).

Leading the charge on the need for affordable, sustainable, and adequate pensions are the ILO, the OECD, and the World Bank (OECD, 2005; Durán-Valverde et al., 2022; World Bank, 2008; Holzman et al., 2008). And over the years, defined-benefit plans, in which employees get a life annuity based on years of service and final salary, have given way to 401(k) plans as the preferred pension option. The 401(k) which originated in the United States and became the foundation of the worldwide Defined Contribution schemes, where the responsibility to savings fall on the individuals (Munnell et al, 2005). This implies that individual investors should carefully consider their decisions of allocation of assets within programs for retirement savings, especially with the rise in 401(k) and similar retirement savings initiatives and the decline in defined-benefit plans (Blake, D ,2000; Mitchell, O. S., & Utkus, S. P.,2022).

The study focused on a private company, Atlas Copco Zambia Limited. Atlas Copco Pension Scheme is operated on a defined contribution basis where retirement benefits are based on an individual member's portable benefits i.e., the total of the retirement contributions paid by the member and Atlas Copco (employer) on behalf of the member, plus interest during the member's participation in the Pension Scheme less expenses. This is in accordance to section 18 (2) of the Pensions Regulation Act, 2005.

This study focused on the adequacy objective as it is an essential goal of pension systems. A comprehensive study was conducted to assess the benefits adequacy of occupational pension scheme by investigating the determining factors of individual retiree's projected replacement rates, which serves as an indicator of post-retirement income adequacy. The study identified areas for improvement and recommendations for enhancing the effectiveness of such schemes were provided. It endeavoured to shed light on the current state of these schemes and their ability to meet the evolving retirement needs of Zambian workers.

1.2 Problem Statement

In Zambia, as in many other countries, the issue of retirement income security has gained increasing attention due to changing demographics, economic fluctuations, and evolving retirement needs. There is a potential inadequacy of benefits provided by occupational pension schemes in Zambia in ensuring a financially secure retirement for employees making it crucial to assess whether these schemes are effectively meeting the retirement needs of its participants. This problem is compounded by the lack of comprehensive employer data such as; information on pension contributions, coverage rates, and retirement ages, which provides insights into how pension schemes are structured and how they impact workers' retirement outcomes. The lack of analysis of employer data makes it challenging to determine the true extent of benefits adequacy and to identify areas for improvement. Therefore, there is an urgent need to conduct a Scheme Benefits Adequacy Study for Occupational Pension Schemes in Zambia to evaluate the existing schemes, identify factors affecting benefits adequacy, and propose strategies for enhancing the retirement income security of Zambian workers upon retirement.

1.3 Main Objective

The main aim of the study was to assess and evaluate the adequacy of benefits provided by Private Occupational Pension Schemes in Zambia in meeting the retirement needs of employees.

1.4 Specific Objectives

The objectives that have been specifically established for this study include;

1. Calculate the Income Replacement Rates that can be achieved by the Pension Scheme (for its members) under the status quo using the Income Replacement Ratio method;
2. Review the adequacy of the member and employer contribution rates (towards retirement savings) to deliver a decent pension at retirement by conducting a scenario analysis;
3. Determine the level of improvement the combined Income Replacement Rates can achieve by combining the benefits from mandatory public pension scheme and that from the occupational pension scheme under the current conditions.
4. Compare and benchmark the contributions rates under the Pension Scheme against other pension schemes

1.5 Research Questions

1. What current income replacement rates can be achieved by the Pension Scheme (for its members) under the status quo?
2. What member and employer contribution rates (towards retirement savings) is adequate to deliver a decent pension at retirement?
3. To what extent does combining the benefits from mandatory public pension scheme and that from the occupational pension scheme under the existing conditions improve the income replacement rates of the benefits of the pension scheme?
4. Is the current pension scheme contribution rate adequate in comparison to what is adopted by other pension schemes in Zambia?

1.6 Significance of Study

The significance of the study lies in its potential to address critical issues and bring about positive changes in the Zambian retirement landscape. By assessing the adequacy of benefits provided by occupational pension schemes, it can help identify gaps and weaknesses in the current system, ultimately leading to more financially secure retirements for Zambian workers. A more robust pension system can have broader economic implications. It can reduce the reliance on state-funded retirement benefits, potentially easing the burden on government finances and promoting long-term economic stability. A well-functioning pension system can contribute to social welfare by reducing the risk of elderly poverty and providing a safety net for retirees, ensuring they can maintain a decent standard of living in their later years. Additionally, the study can contribute to the broader understanding of retirement income security within the country and beyond.

1.7 Scope of the Study

The study specifically examined private occupational pension schemes provided by employers to their employees in Zambia, in the case Atlas Copco Zambia Limited. The research only targeted the active participants of the Pension Scheme provided by Atlas Copco Zambia Limited. It will not cover social security systems, voluntary individual retirement savings plans, or other forms of retirement savings other than the contributions made to NAPSA. The study will examine the benefit structures of occupational pension schemes, including contributions, pension formulae, retirement ages, and ancillary benefits. It will also consider how benefits are adjusted for inflation and cost of living.

1.8 Definitions of key terms and concepts

1. Occupational Pension Schemes: Occupational pension schemes, also known as employer-sponsored or company pension schemes, are retirement benefit programs established by employers to provide retirement income and other related benefits to their employees. These schemes are typically funded by both employers and employees through regular contributions.

2. Benefits Adequacy: Benefits adequacy refers to the extent to which the pension benefits provided by occupational pension schemes are sufficient to meet the financial needs and maintain the standard of living of retirees during their retirement years. It assesses whether the benefits adequately replace the income earned during the individual's working years.

3. Contributions: Contributions in the context of pension schemes are the regular payments made by employees and employees at an agreed rate into the pension funds.

4. Investment Strategies: Investment strategies refer to the plans and approaches used by pension schemes to invest the accumulated contributions and assets.

5. Regulatory Framework: The regulatory framework encompasses the rules, laws, and regulations governing the establishment, operation, and oversight of pension schemes in Zambia.

6. Income Replacement Rate ("IRR"): The proportion of an individual's estimated pension in the year following retirement to their anticipated salary in the year preceding retirement, without taking into account taxes and other deductions.

1.9 Organization of the Report

This section gives a breakdown description of the structure of the research report which is split into six chapters. Chapter one provides the reader with an introduction to the study. It contains the background to the study, the problem statement, the objectives, significance and scope of the study, key definitions and organization of the report. The second chapter acknowledges what other authors have discovered from their research about pensions, their performance and adequacy of the benefits given to pensioners. It also shows the methodologies that other researchers employed in their studies. Chapter Three discusses the methodology employed, while Chapter Four illustrates the Presentation and Analysis of the data used. Chapter Five discusses the findings of the study, and finally the conclusions and recommendations are in Chapter Six of this paper.

CHAPTER TWO: LITERATURE REVIEW

2.1 Introduction

Pensions have been defined differently, yet all point to the provision of regular retirement income during post-employment. Borg & Andrén (2015) define pensions as: "…a series of periodic money payments made to a person who retires from employment because of age, disability, or the completion of an agreed span of service." The aim of the pension funds is to secure income that provides a good standard of living after retirement. Blake. D (2000) states that, "a pension plan should maintain a reasonable living standard after retirement to avoid old-age poverty and burdening society." In essence, a pension scheme represents the future for each employee. As individuals inevitably age, retirement transitions from a concept to a tangible reality, bringing with it the potential risk of elderly poverty. Hence, the concept of retirement benefits reinforces the idea that pension income plays a crucial role in shaping the future for every employee.

2.2 Theoretical review

According to conventional theory, individuals save for retirement through financial intermediaries, commonly known as social security funds or pension schemes. In reality, the utilization of pension benefits, considered a form of 'forced savings' by pensioners, is governed by rules and regulations established by social security organizations. These regulations are further overseen by government policies and adhere to principles internationally endorsed. Among these principles is that of adequacy, asserting that the income provided to retirees should be sufficient to support a decent standard of living after retirement.

2.2.1 Overview of the Pensions Industry in Zambia

The Pensions and Insurance Authority (PIA), which was established in response to modifications to the Pension Scheme Regulation Act No. 28 of 1996 as amended by Act No. 27 of 2005, regulates the pensions and insurance industry in Zambia. Occupational pension plans, alternatively referred to as private pension plans, are governed by the PIA. Employers set up these plans, which provide a range of advantages such as a lump sum

(up to a certain amount) and retirement pension income. These benefits are typically dependent on:

1. The final earnings of the employee (in the case of final salary defined benefit schemes).
2. The average earnings over the entire career of the pensioner (for career average defined benefit schemes).
3. The value of the employee's pension fund at the time of retirement (applicable to defined contribution schemes).

In addition to retirement benefits, these pension schemes can extend benefits to dependents in the event of death during employment or after retirement. Notably, pension benefits are transferable and need not to be halted; if the employment status of an individual changes, they have the option to transfer to another scheme with a different employer. Alternatively, one may choose to leave their accrued benefits within a scheme, accessing the pension at a later date, this is commonly referred to as a deferred benefit.

As at 31 December 2022, the total number of active occupational pension Schemes in Zambia was 248. Total membership stood at 141,267 while combined occupational pensions industry net assets were valued at K12.817 billion.

The Zambian industry's pension scheme design is predominantly Defined Contribution (DC). This is explained by the massive transition of pension schemes from Defined Benefits (DB) pension plans to DC plans at the beginning of the 21st century, in an effort to address the long-term sustainability of retirement benefits provision by sponsoring employers who also wanted to manage the related costs. This is due to the benefit funding risk being borne by the sponsoring employer under a DB pension arrangement, whereas under a DC arrangement, members bear this risker (Bodie et al., 1985). However, the contribution rates for the occupational pension plans vary considerably amongst the pension schemes, and in turn the income replacement targets vary accordingly.

When pension schemes transitioned from DB to DC plans, many maintained the same contributions (as under DB) which represent the cost of benefit provision. Therefore, a DC scheme with the same contribution structure as a DB scheme, should achieve the

same target benefits as the DB scheme assuming the DB scheme contributions were sufficient to purchase the target benefits.

There are basically five (5) statutory pension schemes in Zambia, however, this study only focuses on the Public Service Pensions Fund (PSPF), Local Authorities Superannuation Fund (LASF) and the National Pension Scheme (NPS), which is run by the National Pension Scheme Authority (NAPSA).

Case Study 1: Local Authorities Superannuation Fund (LASF)

Under Government Notice Number 314 of 1954, the Local Authorities Superannuation Fund (LASF) was established as a pension plan exclusively for foreign officers. However, in May 1963, the LASF Act, Cap 476, was passed, allowing all permanent officers and employees who were between the ages of 18 and 50 and earning at least K500.00 annually to become members. The LASF Act was renamed to Cap 284 of the Zambian Laws in 1997. The Scheme has a normal age of retirement of 60 and contributions to the fund are comprised of that made by the employee and employer at the rates of 10% and 23%, respectively bringing total contribution rate to 33% of Pensionable Salary.

LASF covers for Local Authorities employees prior to 1st February 2000. It is a DB arrangement where pension at retirement is calculated based on the following predetermined formula;

$$Accrual\ rate\ X\ Accrued\ past\ serviceX\ Annual\ Salary\ at\ retirement$$

Equation 1

where: Accrual rate = 1/55 of the retirement salary for each year served.

Therefore, a career-service employee that contributes to LASF from the age of 20 to 60 (for 40 years), will accrue pension that is, 73% of their salary at retirement i.e., an income replacement rate of 73%, which is derived from “accrual rate x accrued past service” i.e., 1/55 x 40. The members of LASF can commute up to two-thirds of equivalent cash lump sum of this pension at retirement.

Case Study 2: Public Service Pensions Fund (PSPF)

The Public Service Pensions Fund (PSPF) was created by Chapter number 260 of the laws of Zambia, Act No. 35 of 1996. It is a DB pension scheme which provides pension benefits to retired public civil servants. Its membership is drawn from the Judiciary Service, teaching Service, Defence Forces, Police and Prisons, Zambia Security and The Intelligence Service. PSPF also administers a home ownership scheme for its members and engages in lucrative business practices that are in the best interest of members. The Scheme has a normal age of retirement of 60 and contributions to the fund are comprised of that made by the employee and employer each at the rate of 7.25% bringing the total contribution rate to 14.5%. The benefit at retirement is calculated using the following predetermined formula:

$$Accrual\ rate\ X\ Accrued\ past\ service\ X\ Annual\ salary\ at\ retirement$$

Equation 2

where: Accrual rate = 1/60 of the retirement salary for each year served.

Therefore, a career-service employee that contributes to PSPF from the age of 20 to 60 (for 40 years), will accrue pension that is, 67% of their salary at retirement i.e., an income replacement rate of 67% which is derived from “accrual rate x accrued past service” i.e., 1/60 x 40. The members of PSPF can commute up to two-thirds of equivalent cash lump sum of this pension at retirement.

Case Study 3: National Pension Scheme Authority (NAPSA)

NAPSA was established through an Act of parliament, the National Pension Scheme Act of 1996 and commenced operations on 1st February 2000 after being transformed from the then Zambia National Provident Fund (ZNPF).

Its main mandate is to act as safety net for retirement benefits provision and other social security benefits to workers in the country. Membership to NAPSA is compulsory for all regularly employed persons including those that had been contributing to the ZNPF and those employed under the civil service and local authorities after 1st February, 2000.

Benefits under NPS are funded through employee and employer contributions, each at a fixed rate of 5% of insurable earnings, subject to an annual contribution ceiling established using the average national salary index. The total contribution rate is therefore 10% of the insurable earnings (subject to the contribution ceiling).

The monthly benefit retirement pension is calculated using the following formula:

$$G = AIME\ X\ \frac{40}{30X12X100}\ X\ M$$

Or $G = AIME\ X\ 0.001111M$

Equation 3

Where:

"G" is the monthly pension;

"AIME" is the Average Indexed Monthly Earnings; and

"M" is the number of months of pensionable employment.

Therefore, 0.001111M is the replacement rate and as such a career-service employee that contributes to NPS from the age of 20 to 60 (for 40 years), will accrue pension that is, 53% (0.00111x480x100) of their Average Indexed Monthly Earnings i.e. they will achieve an income replacement rate of 53%.

It is essential to note that the pension at retirement under NPS is subject to a minimum pension pegged at 20% of the National Average Earnings. Annual National Average Earnings in 2023 are K80,520 (i.e., K6,710 x 12). This floor is in place to meet the objective of the NPS benefit being a basic social safety net, meant to avoid poverty post retirement.

Recently the government of the Republic of Zambia enacted into the National Pension Scheme Amendment Bill No. 1 of 2023 into law, which allows NAPSA members to partially withdraw their retirement savings up to 20% of accumulated contributions with interest and indexation to wage inflation (on condition they have at least paid 60 monthly

contributions or attained the age of 45). However, if a member exercises this option, it will reduce the ultimate income replacement rate at normal retirement.

2.2.2 Benefit Plans

Employers and workers have the option to select either Defined Contribution (DC) or Defined Benefits (DB) plans. According to Bodie et al. (1985), “DBs and DCs differ markedly in terms of risks, susceptibility to inflation, funding mechanisms, and government oversight.” Nevertheless, there is another alternative called collective defined contribution (CDC) that is currently accessible for participants, as outlined by Kalwarski (2015)

A defined benefit plan outlines the retirement benefits for an employee. The pension amount, calculated based on factors such as years served in employment, final salary, retirement age, and accrual rate, is specified. According to The International Accounting Standards (IAS) 19, “the recognized amount in the balance sheet represents the present value of the defined benefit obligation, adjusted for various factors”. This places the risk on the employer, who is obligated to provide the agreed-upon benefits to its current and former employees benefit (Wang et al., 2014). Early retirement options may result in reduced payments to account for longer payment periods.

Conversely, defined contribution plans have gained global popularity. In these plans, each member's contributions go into individual accounts, invested in various sectors (IFRS Foundation, 2011). Returns, positive or negative, directly impact the member's account. At retirement, benefits are based on the accumulated sum. Unlike defined benefit plans, in defined contribution plans, employees assume investment risks and rewards, and many employers are opting for this approach to avoid the high costs associated with defined benefit plans (Yohane, R., Mwanza, B. G., & Chowa, T, 2022).

The transition from DB to DC pension schemes in most countries, emphasizes the importance of having accurate pension-related information for making informed retirement choices. In 1988, Mitchell emphasized the concern that a “lack of understanding of pension incentives can lead workers to save or spend in a suboptimal manner and retire prematurely”, underscoring the importance of providing better pension

information. Additionally, the level of pension knowledge is linked to the availability of information and is influenced by the associated costs and benefits of acquiring such information. (Gustman and Steinmeier, 2005).

In many countries, pension arrangements typically involve a blend of government-sponsored plans, legally mandated private retirement savings, and optional private retirement savings. This combination has evolved to enhance the sustainability and efficiency of pension systems by distributing the responsibility away from governments as the sole contributors (Momba Kalyabanthu, 2006).

2.2.3 The Concept of Pension Adequacy

The concept of pension adequacy lacks a single definition, despite its frequent use in discussions and societal perspectives. However, the World Bank, interprets an adequate pension system as: a system that sufficiently provides benefits to the entire population to prevent old-age poverty on an absolute level, specific to the countries, as well as reliable means to smooth lifetime consumption for the vast majority of the population (Holzmann and Hinz, 2005). The OECD characterizes sufficient pension benefits as those that ensure the preservation of a respectable quality of life during one's elderly years (OECD, 2012). Similar to other parties involved, they generally refrain from explicitly specifying the pension amount required to fund a "decent" quality of life. Nonetheless, as a general guideline, the OECD aims for pension levels (inclusive of both public and private pensions) that substitute approximately 70% of the final salary. This aligns closely with the goal set by Holzmann and Guven (2009), in the World Bank report, which establishes an 80% net replacement rate as a benchmark for adequacy. The authors emphasize that achieving this level of adequacy should involve a combination of public and private provisions for old age. Lastly, the ILO outlines minimal requirements for adequate pension levels, aiming to ensure a respectable living standard in advanced age.

In conclusion, a global agreement exists, that effective pension systems should focus on reducing poverty and ensuring a stable life-cycle consumption, ultimately delivering a satisfactory quality of life in old age. Diverse opinions exist regarding the specific amount

that would render pension levels adequate. It is important to consider these varied perspectives when interpreting the outcomes presented in the subsequent chapters.

2.2.4 Pension Indicators

Pension indicators play a crucial role in evaluating the adequacy of retirement systems. As populations age and life expectancies increase, the importance of robust pension programs becomes paramount. Policymakers, analysts, and the public rely on key indicators to assess the performance of pension plans. While a general understanding of what constitutes pension adequacy exists, there is no unanimous accord on the method of measurement. In fact, each major international stakeholder, including the OECD, ILO, and World Bank, has devised its unique set of indicators to assess the extent to which pension systems are adequate. Moreover, within academic literature, there is no universally accepted metric for estimating pension adequacy. Given this context, Table 1 offers a classification of notable adequacy indicators employed at the global level. It outlines the principal conceptual distinctions among these metrics, and offers a summary of common indicators, rather than presenting a comprehensive view of adequacy measures.

Indicator Group	Replacement rate indicators						Life-cycle wealth indicators	
Concept Name	*Replacement rates*	*Theoretical replacement rates*	*Benefit ratios*	*Aggregate replacement ratio*	*Relative median income ratio*	*Gross average replacement ratio*	*Pension wealth*	*Wealth-consumption ratio* [4]
Institution/Author	OECD	EC - ISG [1]	EC - AWG [2]	Eurostat	Eurostat	EC - AWG [2]	OECD	e.g. Hurd and Rohwedder (2008)
Numerator	initial pension	initial pension	average pension	median pension of persons aged 65-74	disposable income of people aged 65+	initial pension	pension wealth	retirement wealth
Denominator	average life time earnings	final earnings	economy wide average wage	median earnings of persons aged 50-59	disposable income of cohorts younger than 65	economy wide average final earnings	earnings [3]	retirement consumption
Gross	v	v	v	v		v	v	-
Net	v	v			v		v	-
Theoretical	v	v					v	
Empirical			v	v	v	v		v
Single age group	v	v				v	v	v
Multiple age groups			v	v	v			
Individual perspective	v	v					v	v
Societal perspective			v	v	v	v		
Historic estimates			v	v	v	v		
Prospective estimates	v	v	v			v	v	v
One point in time	v	v	v	v	v	v		
Life-cycle							v	v

1 ISG = Indicators' sub-group of European Commission (EC); **2** AWG = Working Group on Ageing Populations and Sustainability of EC; **3** The OECD applies individual gross earnings as denominator for both gross and net pension wealth; **4** This name shall serve as a general label of indicators in the tradition of Hurd and Rohwedder (2008).

Source: Freiburg, Sommersemester 2015

Table 1: Key concepts to measure adequacy of pensions

2.2.5 Theoretical Replacement rates

The most prominent measure for assessing the function of income smoothening is represented by replacement rates. These rates indicate the proportion of pension benefits in relation to earnings during the working life. In the Pensions at a Glance 2007 report by the OECD (OECD, 2007), they compute gross and net replacement rates for individuals sampled, commencing their employment journey at the age of 20 and continuing until retirement. Replacement rates are utilized to measure the extent to which one can sustain their standard of living post-retirement. In the context of this research, replacement rates

are the proportion of the initial pension benefits P in relation to the average pre-retirement earnings AE over the preceding 2 years leading up to retirement.

$$RR_{r,f} = \frac{P_{r,f}}{AE_{r,f}}$$

Equation 4.

Where *r* = retirement age and *f* = future year

2.2.6 A Framework for Assessing Retirement Income Adequacy

A comprehensive framework for evaluating the adequacy of retirement income is a valuable approach to guide discussions, should consider various factors to ensure a comfortable and secure post-employment life. This is significant as discussions on adequacy frequently intertwine inquiries about defining adequacy, determining the adequacy standard, and identifying the applicable criteria for adequacy. evaluating retirement income adequacy. The framework outlined in the figure below distinguishes between the various elements involved in appraising retirement income sufficiency.

Source: OECD Pensions Outlook 2020

Figure 1. A framework for assessing retirement income adequacy

The objective of an adequate retirement income refers set of goals or targets that a retirement income system aims to achieve in ensuring that individuals receive a satisfactory and sustainable income during their retirement years. A measure of retirement income is called an indicator. A suitable proxy for a specific objective is what an indication should be. Numerous indicators exist, however certain methods are more common than others. An instance of a frequently utilized metric is the retirement income replacement rate. Targets serve as benchmarks to assess the adequacy of retirement incomes. Establishing a target entails defining a standard for sufficiency, such as determining a replacement rate that is appropriate, establishing a minimum subsistence

standard, or establishing a quality of life that allows individuals to experience comfort. When policymakers evaluate the outcomes of adequacy indicators in relation to these targets across a population, they can assess whether the retirement income system effectively delivers generally satisfactory retirement incomes (OECD, 2020).

2.3 Empirical Review of Studies on Pension Income Adequacy

Numerous empirical studies have been conducted on the sufficiency of pension funds. However, the selected researches for this study are based on their relevance to the subject. Notable, most research of this kind focuses on developed nations. Several studies conducted in developed countries have investigated the adequacy of pension benefits, yielding varying findings. For instance, two distinct researches on the United States conducted by Hurd et al. (2006) and Hamermesh (1984), and were grounded on the Life-Cycle Hypothesis, revealed a decline in spending on goods and associated services among retirees upon reaching retirement age. On the contrary, Filip (2012) employed an income-based techniqe to assess how adequate pension schemes are in 26 European nations. This study identified the Netherlands, Luxemburg, France, Austria and Germany as having the most adequate pension systems, while, Latvia, Estonia, Lithuania, and Cyprus were deemed least adequate.

Similarly, La Rochelle-Cote et al. (2010) did a study on Canada and discovered that very low replacement rates were experienced by some individuals during retirement, with approximately 20 percent having a replacement rate as low as 6 percent. The study concluded that these replacement rates were inadequate and are negatively correlated to family income.

Zaidi (2010) examined the pension benefits ratio using the gross replacement rate of earnings (GRR) and assessed the fiscal sustainability of public finances in 13 European Union (EU) countries, covering the period from 2008 to 2060. The findings indicated that there is high risk of lower pensions for future pensioners in Portugal, Poland, Estonia Sweden, France and Austria. Moreover, during the period of study, six countries experienced a significant fall in the value of pensions. Zaidi (2010) asserted that," pension reforms in the UK, Finland, France, Germany, and Belgium protected low earners,

whereas Portugal, Italy, and Austria witnessed a fall in adequacy. Conversely, nations like Hungary, Poland and Slovakia showed strengthened payments of pensions

In a different investigation, Borella et al. (2009) examined the adequacy of pension schemes using the Comprehensive Replacement (CORE) rate and analyzing data sourced from the European Community Household Panel (ECHP). The assessment of living standards before and after retirement indicated a reduction in the replacement rate, signifying a decline in pension adequacy. For instance, the study observed a decrease in CORE in France, falling from 57 percent (57%) in 2020 to 47 percent (47%) in 2050. Findings for Spain and Germany also indicated diminishing replacement rates. Countries exhibiting more consistent CORE rates included the UK, Denmark and Luxemburg, while four other countries showed an increase in adequacy.

Despite the extensive studies in developed nations, there is a noticeable dearth of empirical studies on the adequacy objective of pension systems in developing countries, particularly those in Africa. Studies in Africa on adequacy have been limited, with a focus on aspects beyond pension systems. This scarcity of empirical research in Africa is attributed to delayed development of a formal working class, trade unionism, and the creation of safety nets for employment in developing nations. Noteworthy studies on adequacy in developing countries include those by Barry et al. (2011), Knoeppel et al. (2009), Brighouse (2009b), and King et al. (2005).

In Zambia, the empirical study on adequacy by Yohane et al. (2022) was used. However, this study's focus area was on the adequacy, affordability and sustainability of Pensions in Higher Learning Institutions in Zambia.

In general, the literature review indicates that a majority of studies assessed adequacy by considering both pension benefits and other sources of income (La Rochelle-Cote et al., 2010; Borella et al., 2009; Hurd et al., 2006; and Hamermesh, 1984). These studies operated under the assumption that sufficient pension benefits have a positive impact on the well-being of beneficiaries. Notably, some research endeavors employed wealth as a measure of adequacy during both working and retirement phases, indicating a negative correlation between family wealth and replacement rates. However, it is crucial to

highlight that using wealth as a metric for adequacy might not be suitable, especially in economic set ups with substantial informal sectors like Zambia, where a significant portion of income remains unaccounted for in official statistics.

Moreover, the literature survey underscores the absence of any study in Less Developed Countries (LDCs) employing ratio analysis (specifically, demographic ratio, system replacement ratio or catchment ratio) to gauge adequacy. Alternatively, the predominant approach in existing studies involves the use of replacement rates. Therefore, in the evaluation of the adequacy of the private social security systems in Zambia, this study deviates from prior methodologies by incorporating coverage ratios in the analysis.

2.4 Theoretical Framework

The life-cycle hypothesis (LCH), linked to Modigliani and Bromberg (1954), Modigliani (1957), and Ando and Modigliani (1963), provided insight into the adequacy of a social security system. In the initial phase of the life cycle, individuals are not employed and, therefore, do not accumulate savings for retirement. Modigliani proposed that income generation commences at the age of 20, progressively increases throughout the working years, and attains its peak at the retirement age. Consequently, individuals manifest three stages of saving throughout their life cycle: borrowing during the early working age (20-45 years), where consumption surpasses income; in midlife (45-60 years), income exceeds consumption, resulting in savings; and, finally, dis-saving occurs post-retirement, typically after the age of 60.

The Income-based method has also been used in some studies, which generally refers to a methodology or approach that relies on income-related factors for analysis, calculation, or decision-making. This method involves determining benefits or contributions based on an individual's income level. For example, the amount of social security benefits a person receives may be tied to their lifetime earnings.

A comprehensive replacement rate typically refers to the percentage of a retiree's pre-retirement income that is replaced by the benefits from these systems. It's a measure of how well a pension system provides income security in retirement. A comprehensive

replacement rate would likely take into account various sources of income replacement, such as Social Security benefits, pensions, and other retirement savings.

2.5 Conceptual Framework

The conceptual framework for this study is influenced by the conceptual framework design adopted by the World Bank. The main assessment criteria include adequacy, sustainability, affordability, predictability, equity and robustness (Holzmann et al., 2008; World Bank, 2008). However, this study is focused on the common indicator of a pension system, that is, adequacy. Below is the conceptual framework for this study;

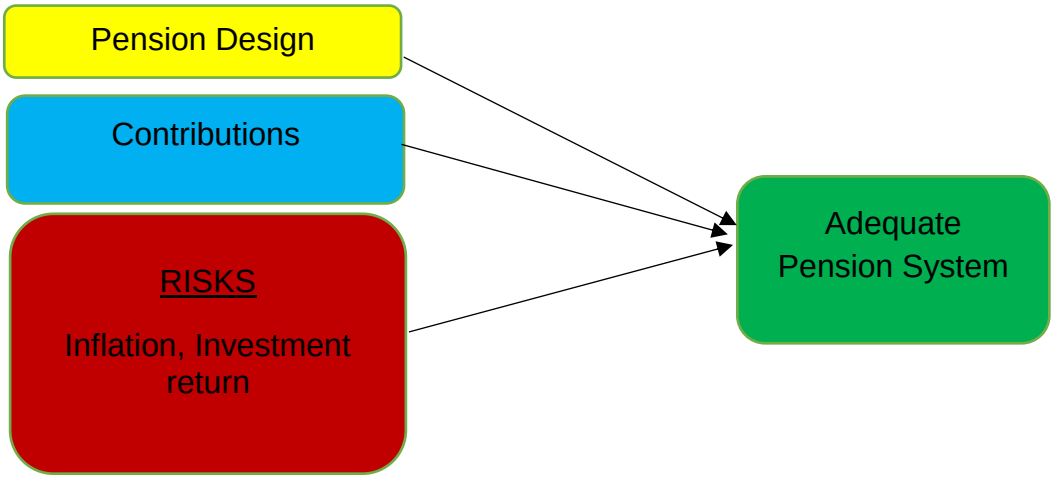

Figure 2. Conceptual Framework

Independent Variables

The independent variables of this study include the contributions, general inflation, and the net investment returns. The total amount contributed to the fund is affected by the total contribution rate (i.e. the combination of the employee rate with that of the employer). The amount of contributions in the fund determines the pension benefits of the pensioner.

Inflation is an economic term that refers to the general increase in the prices of goods and services within an economy over a certain period of time. It has significant implications, affecting both pensioners and pension funds as it erodes the real returns on investments.

Net investment returns refer to the gains or losses generated by an investment portfolio after accounting for all associated costs and expenses. It is a measure that reflects the actual profitability of an investment, taking into consideration not only the investment gains but also any fees, taxes, transaction costs, and other related expenses incurred during the investment period. It is key to take note of this variable as it directly impacts the retirement outcomes of individuals participating in pension plans and contributes to the overall effectiveness of pension fund management.

Dependent Variables

The dependent variable of this study is the Income Replacement Rate (IRR), which determines the adequacy of a pension system. The IRR a financial metric that measures the percentage of a person's pre-retirement income that is replaced by their post-retirement income, typically in the form of pension benefits. It depends on the income of the employees, salary inflation rate, general inflation, net investment returns, the total rate of contributions and the normal age of retirement. IRRs are used in assessing the adequacy of the pension fund.

CHAPTER THREE: METHODOLOGY

3.1 Introduction

This chapter presents the phases taken in the research which included; collection, data selection or cleaning and analysing of data to attain the research objectives. The research methodology for this study followed a quantitative approach.

The study involved the analysis of the existing data obtained from various sources, such as the membership data for the Atlas Copco Pension Scheme as at 31 December 2022, and information about retirement income targets for the Pensions Industry in Zambia.

Furthermore, consultation and discussions with experienced actuaries, scholars, and researchers was done to develop a robust methodology that ensures the production of high-quality and relevant research findings results.

3.2 Research Approach

This study employed a quantitative research approach. Quantitative research involves the collection and analysis of numerical data, allowing researchers to obtain objective measurements and make statistical inferences. According to Creswell (2014), “quantitative research focuses on gathering numerical data to explain, predict, or control phenomena of interest, and it enables researchers to generalize findings from a sample to a larger population”. Additionally, Guest, MacQueen, and Namey (2012) emphasize that “quantitative research is effective for analyzing large amounts of information to draw meaningful conclusions.”

3.3 Research Design

In this study analysis of the pension scheme documents, financial reports, and regulatory documents to understand scheme design, investment strategies, and compliance with regulatory requirements. A summary of the findings from the analysis of scheme documents, highlighting key design features and areas of compliance or non-compliance with regulations.

3.4 Research Context

The research specifically examined the private occupational pension scheme provided by Atlas Copco Zambia to its employees, that is the active members of the scheme from the time they joined the scheme to 31st December 2022.

3.5 Study Population

The target population consisted of 34 active members of the Atlas Copco Pension Scheme, contributory and non-contributory members.

3.6 Sample and Sampling Techniques

In this study no sampling technique was employed to the study population as the dataset consisted of a total of less than fifty (50) active members of the pension Scheme making it easy to analyse the entire study population.

3.7 Data Collection

The data used in the study was specifically the data of the private occupational pension scheme provided by Atlas Copco Zambia to its employees. Considering all the necessary variables for the study.

3.8 Model Description

The study used a spreadsheet pension fund valuation model in Microsoft Excel 2016. The model was used to determine the IRRs of the scheme members as follows;

$$IRR = \frac{AP}{PS}$$

Equation 5.

Where

IRR = Income Replacement Ratio

AP = Annual Pension

PS = Projected Salary at normal retirement age

And,

$$AP = \frac{PAC}{AF}$$

Equation 6.

Where;

PAC is the Projected Accumulated Credit at normal retirement age

AF is the Annuity factor from the SA life tables

In determining the projected annual salary at normal retirement age, it was asssumed that the salary will increase by a constant percentage, the salary inflation rate, each year until retirement. Similarly, the projected accumulated credit was determined by assuming a constant annual growth rate which was based on the expected rate of return on investments in the pension scheme.

It is important to note that these projections are based on assumptions and may not reflect actual future earnings. Adjustments may be needed as circumstances change, such as career advancement, job changes, or economic conditions.

3.9 Data Analysis

Conforming to the study objectives and existing literature for the purpose of comparison with similar research, variables such as demographics underwent analysis. The data collected was analysed using a spreadsheet pension fund valuation model in MS Excel 2016, and the average totals of the age, salary and portable services were manipulated. A spreadsheet model was used as it offers transparency into the calculations and assumptions used, and is flexible and can be easily updated to reflect changes in assumptions, regulations, or market conditions. This flexibility allows for scenario analysis to understand the impact of different factors on the adequacy of pension benefits to determine pension fund adequacy.

The data used was obtained from the Membership data of the Atlas Copco Pension Scheme as at 31 December 2022, and information about retirement income targets for the Pensions Industry in Zambia. In particular, the study referred to three (3) case studies relating to;

(i) The National Pension Scheme Authority (NAPSA);

(ii) The Local Authorities Superannuation Fund (LASF) and;

(iii) The Public Service Pensions Fund (PSPF).

In estimating the income replacement rates for each individual, the monthly salary as at 31 December 2022 to normal retirement (at age 60) was projected using the salary increase assumption and the corresponding monthly contributions over the projection period were calculated at the current total contribution rate of 10%. The members' portable benefits at 31 December 2022 were accumulated, and the monthly contributions were projected with assumed interest based on average long-term net investment returns. The study further converted the projected portable benefit at normal retirement using annuity factors, i.e., the element that shows costs of securing a pension of 1-unit payable for life; and the calculated pension, that is, the projected portable benefit above was demonstrated as a percentage of the projected salary at retirement to derive the income replacement rate.

It is crucial to emphasize that when computing the income replacement rate, the income tax situations of the individuals were not considered. Hence, the presented replacement rates are gross figures, not accounting for tax deductions.

Further, scenario analyses were conducted using the model to establish improved income replacement rates where possible by varying some of the parameter values (while holding other assumptions constant) to assess the efficacy of the study.

Reference has also been made to some journals and research studies from multi-lateral institutions such as the World Bank and the Organisation for Economic Cooperation and Development (OECD) on target income replacement rates for a decent post-retirement lifestyle.

3.10 Assumptions

This study used are best-estimate assumptions, and the actuarial principle of ensuring that the assumptions are mutually compatible was followed. Actuarial assumptions are

considered compatible when they align with economic relationships among factors such as inflation, salary increase rates, and discount rates.

The actuarial assumptions used in the study include:

Financial assumptions

- Average inflation for projecting contribution ceiling under National Pension Scheme (NPS) and deriving the appropriate average salary inflation and average net investment returns (ISG, 2006)
- Long-term average net investment income for allocation interest to contributions;
- Salary inflation for projecting the members' salary to normal retirement (Borella et al., 2009);
- Contribution rates for projecting future contributions paid as retirement savings; and
- Net discount rate for calculating annuity factors for the pension conversion.

Demographic assumptions

Post-retirement mortality assumption for defining future life-expectancy of the retirees and for deriving the appropriate annuity factors.

Table 2. Summary of Assumptions

The following table provides an overview of the assumptions made.

Parameter	**Parameter value**
Current contribution ceiling under NPS*	K26,840.0 per month
General inflation	12.6% per annum
Net investment return	15.6% per annum
Salary inflation	14.6% per annum
Total contribution rate	10.0%
Post-retirement net discount rate	5.0% per annum
Post-retirement mortality	A55 (Ultimate) mortality tables

*The contribution ceiling was assumed to increase annually at the general inflation rate.

Additionally, the study assumed that the annuities will be single life annuities (i.e. they are payable until death of one life, which is the retired member) and are subject to a minimum guarantee period of 5 years. The guarantee period implies that if the member dies within

the first 5 years of pension commencement, the pension will continue to be paid to the deceased member's estate up to the 5th anniversary

3.11 Ethical Considerations

Ethical consideration is key to ensure the research is done using standard procedures, and the collected dataset is kept private and confidential throughout the study. For the purpose of this study, ethical clearance was sought and acquired from the University of Lusaka Ethics Board.

CHAPTER FOUR: DATA PRESENTATION AND ANALYSIS

4.1 Introduction

In this chapter the findings and comprehensive analysis of pension data are presented to glean insights into the adequacy and effectiveness of pension systems in ensuring financial security during retirees' post-employment years. This analysis aims to provide insights into whether the current pension provisions are meeting the financial needs of retirees, focusing on replacement rates.

4.2 Data Analysis

Demographics – Gender

The pension scheme had a total of 34 members, the pie chart below shows that the scheme has a percentage of 24 for females and 76 for males.

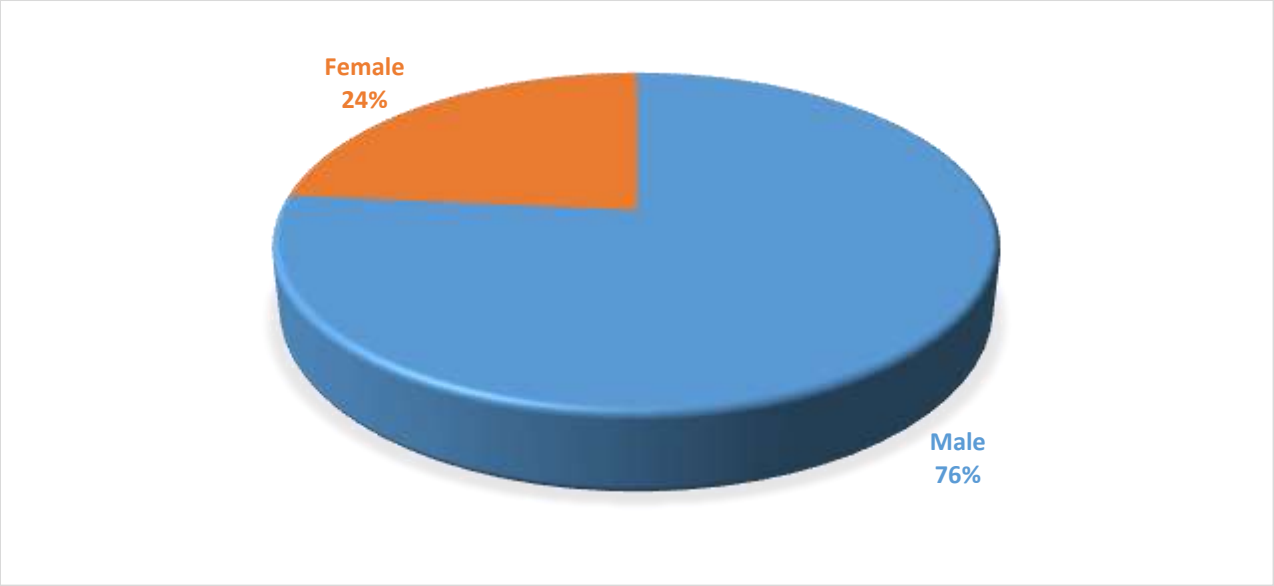

Figure 3. Gender distribution

Member Age distribution

The figure below depicts the distribution of age of the members of the Pension Fund. Only one (1) member fell in the age group of 51 to 60 years (the Normal Retirement Age) representing 2.9% of the total number of members. The age group of 51 to 55 years had the highest number of 9 representing 26.5% of the total number of members of the

scheme. 11.8% of the members belonged to the lowest age group of between 25 and 30 years, and 8.8% belonged to the 35 to 40 years' group.

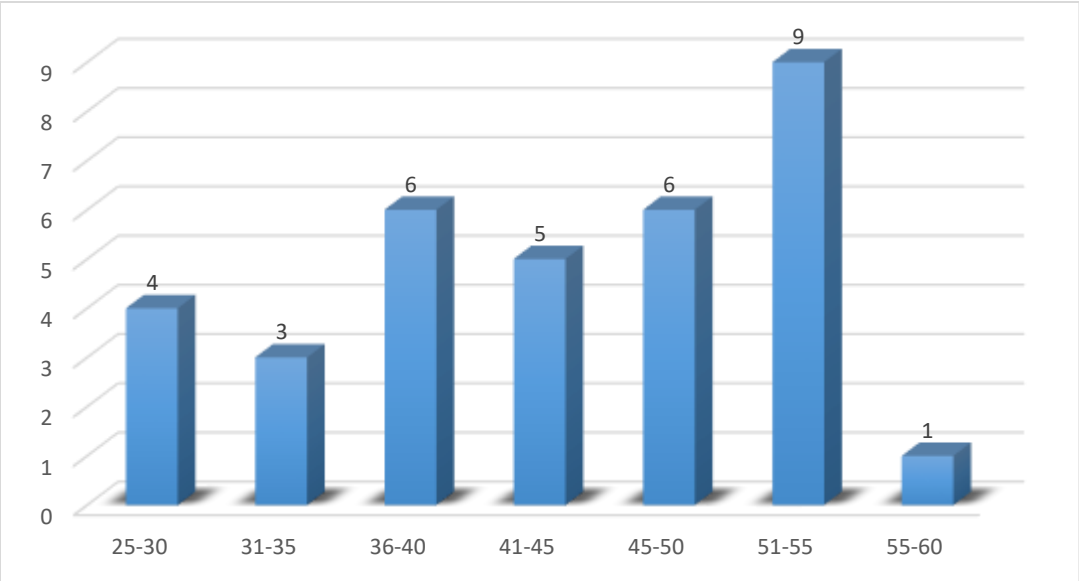

Figure 4. Members' age distribution

As observed from the figure above the majority of the members of the pension scheme were above the age of 35 with a total of 79.4% of all the members of the scheme.

4.3 Active membership data as at 31 December 2022

The Pension Scheme has a total membership of 34, and is therefore a relatively small scheme. Given that total contribution is 10% for both Atlas Copco Scheme and National Pension Scheme (NPS), the current average salary of the Pension Scheme indicates that members earn below the Annual Contribution Ceiling of K322,080 in 2023 (K26,840 monthly contribution ceiling multiplied by 12) prescribed under section 35 of the National Pension Scheme Act. Therefore, the maximum contribution is K1,342 (K26,840 multiplied by 5%) thereby allowing members to contribute more towards their retirement. The members have a short duration of past service with the Pension Scheme, which suggests relatively small portable benefits at 31 December 2022 i.e., the members have had little time under the Pension Scheme to build up adequate retirement savings. The current members are expected to accrue an average total prospective service of 19 years, which is below the career service of 40 years

Table 3. Membership data of the Pension Scheme

The table below shows the descriptive of the membership data as at 31 December 2022

	Non-Contributory Members	Active Members	**Total**
Number of Members	3	31	**34**
Total Annual Salary (ZMW)	161,465	8,150,460	**8,311,925**
Average Salary (ZMW)	53,822	262,918	**244,468**
Average Age	32.7	44.5	**43.5**
Average Past Service	3	2.5	**2.6**
Average Total Service	30.3	18.0	**19.1**
Total Portable Benefits (ZMW)	73,531.4	1,957,106.6	**2,030,637.9**
Average Portable Benefits	24,510.5	63,132.5	**59,724.6**

4.4 Presentation of Results

To determine the income replacement rates that can be achieved for the members of the pension scheme, a model was developed, and the best estimate assumptions were used.

4.4.1 Income Replacement Rates under the status quo

In order to determine the current income replacement rates, the developed model was run based on the current contribution rates (i.e. 10%) and the normal retirement age of 60. The figure below shows the distribution of the members' income replacement rates results obtained.

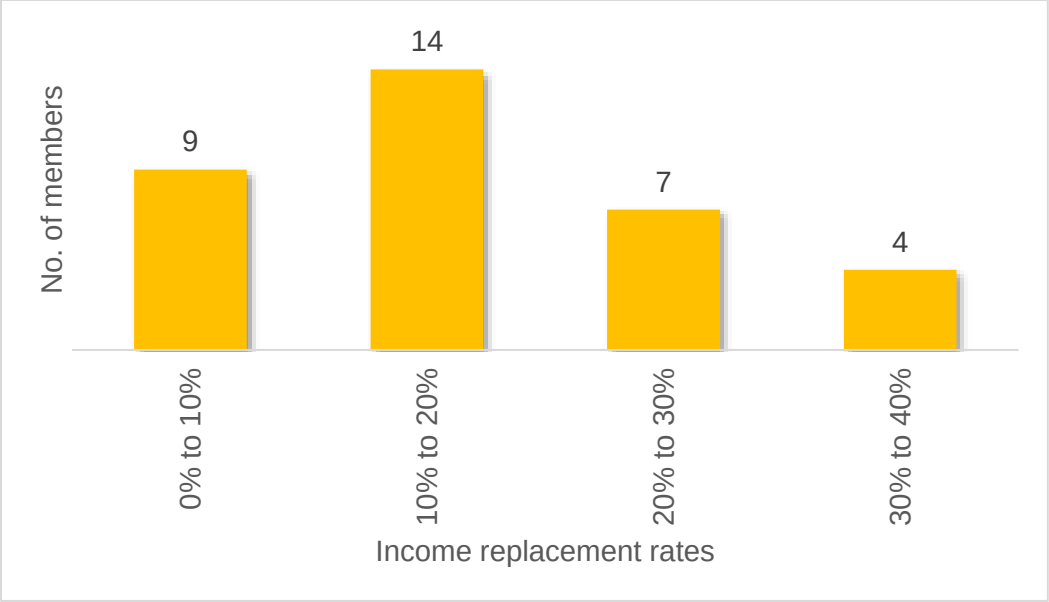

Figure 5. Income Replacement Rates under the status quo

At the current contribution rates, attainable income replacement rates ranged between 3.5% and 37.0%.

4.5 Adequacy review of Pension Scheme Total Contribution Rates

To review the adequacy of the contribution rates towards the retirement savings, four (4) scenarios were tested, to determine which one will improve the low replacement rates obtained under the status quo to deliver decent pension income at retirement. The following are the scenarios tested, leaving all the other assumptions constant;

4.4.2 Scenario 1: Increasing total contribution rate to 15%

The figure below shows the distribution of the members' income replacement rate results obtained when the total contribution rate is increased from 10% to 15%.

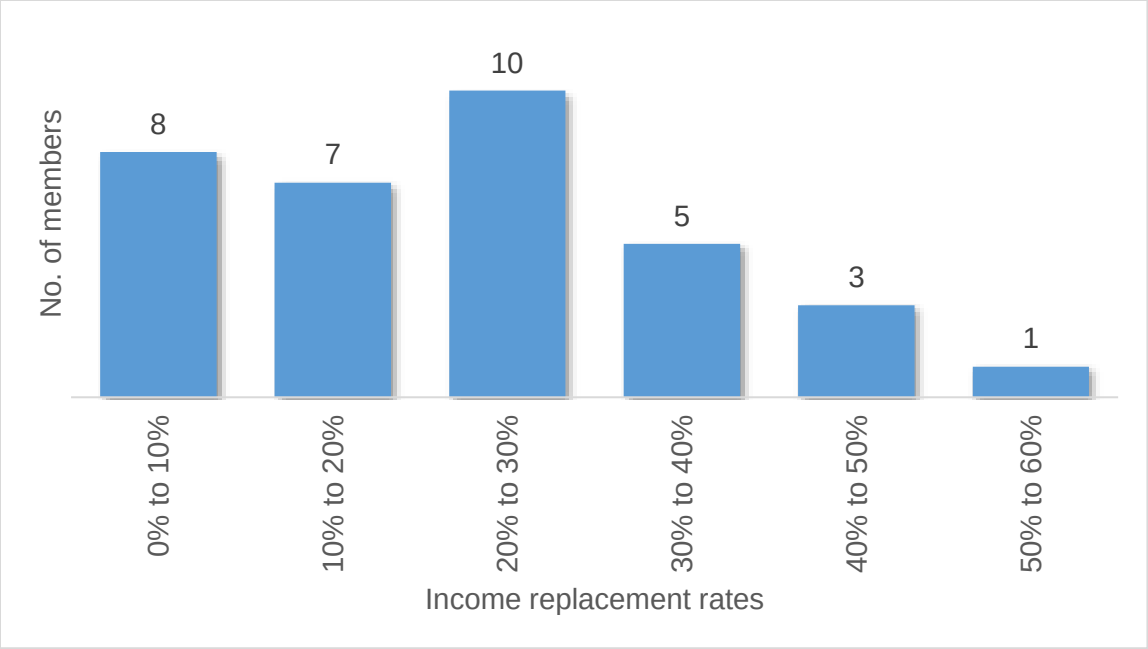

Figure 6. IRR - Increasing total contribution rate to 15%

Increasing the total contribution to 15% showed a small improvement in the income replacement rates, with the highest moving to 54%

4.4.3 Scenario 2: Increasing total contribution rate to 20%

The figure below shows the distribution of the members' income replacement rate results obtained when the total contribution rate is increased from 10% to 20%.

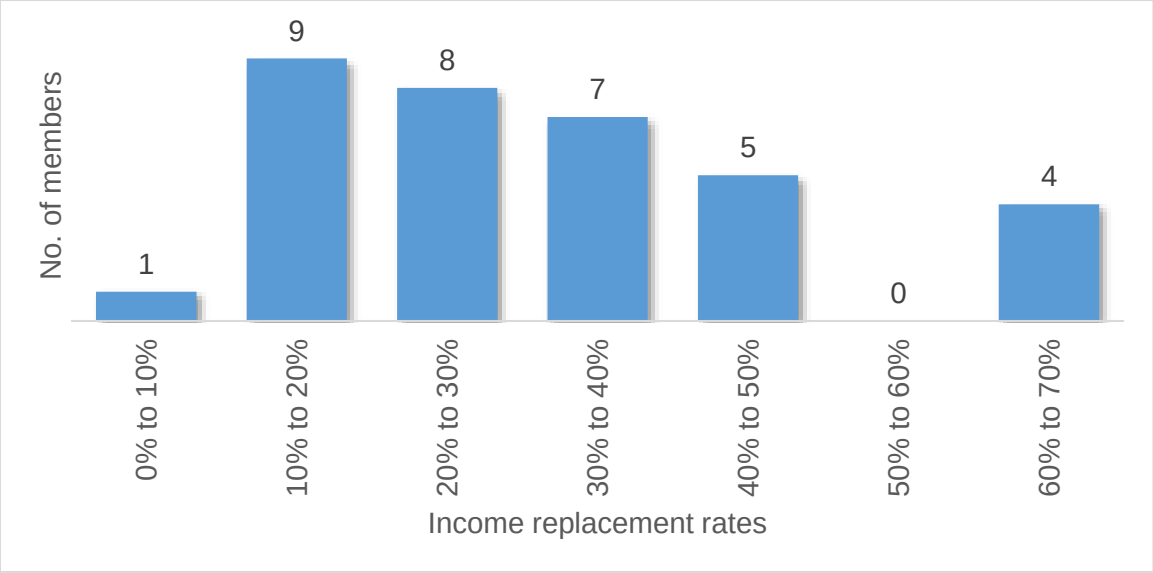

Figure 7. IRR - Increasing total contribution rate to 20%

4.4.4 Scenario 3: Increasing total contribution rate to 25%

The figure below shows the distribution of the members' income replacement rate results obtained when the total contribution rate is increased from 10% to 25%.

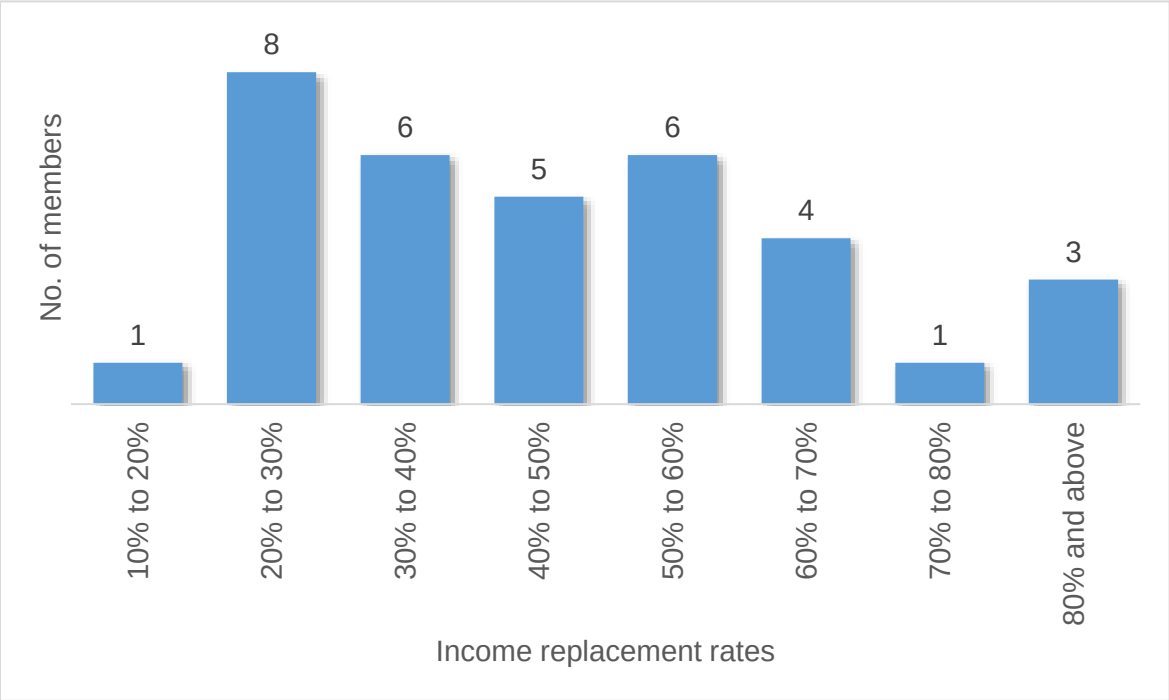

Figure 8. IRR - Increasing total contribution rate to 25%

4.4.5 Scenario 4: Increasing the NRA to 65 and total contribution rate to 25%

The figure below shows the distribution of the members' income replacement rate results obtained when the pension scheme is redesigned by increasing the normal age of retirement from 60 to 65 and increasing the total contribution rate from 10% to 25%.

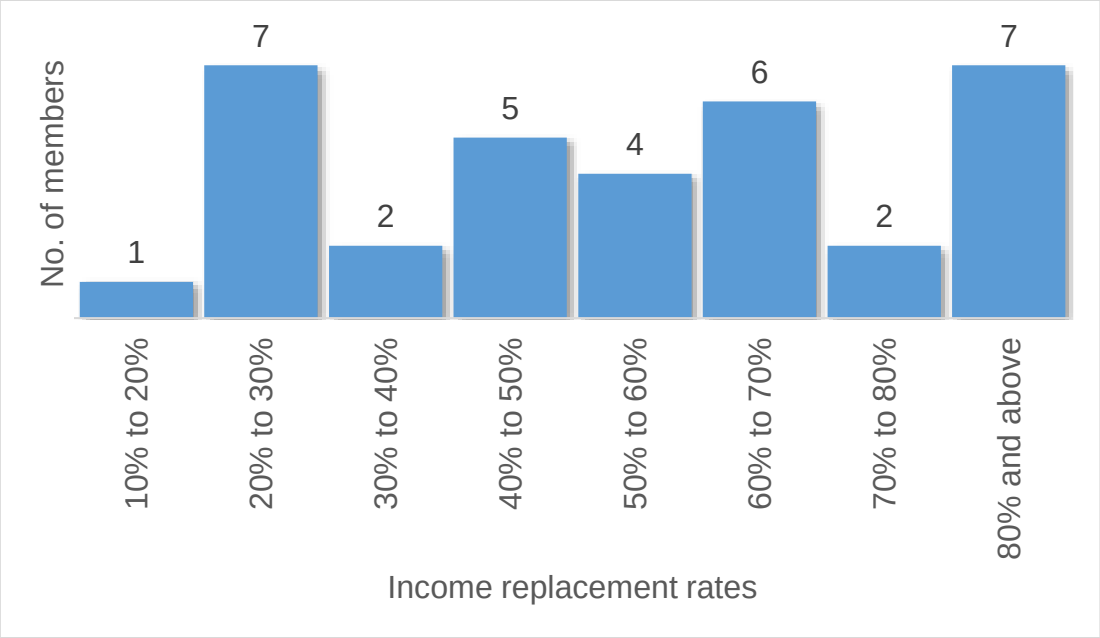

Figure 9. IRR - Increasing NRA to 65 and total contribution rate to 25%

4.6 Consolidated IRR of total Retirement Benefits (NAPSA and Atlas Copco Scheme)

It is also important to consider that the ultimate benefits receivable to a member is a combination of the occupational benefits from the Atlas Copco Pension Scheme and a safety net from NAPSA. The figure below shows the combined income replacement rates if we allow for the benefits from the NAPSA and the occupational scheme at status quo.

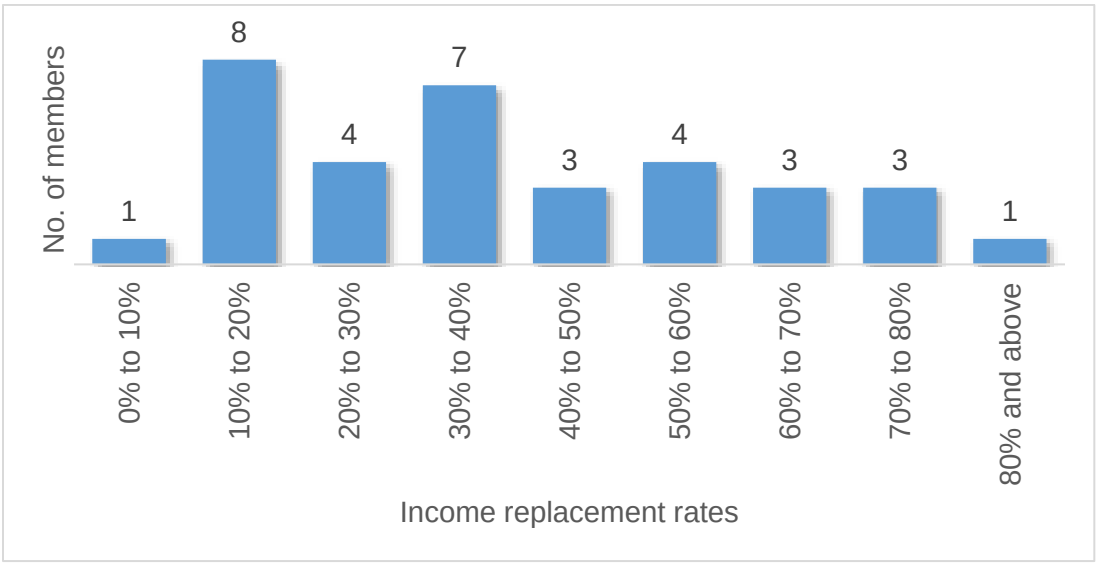

Figure 10. IRR – Consolidated retirement benefits

4.7 Comparison of the contribution rates in the Pensions market in Zambia

Market research indicated that some occupational schemes in Zambia have up to total contribution rate of 30%. Below is the summary of the contribution rates combination (Employer contribution rate - ER plus Employee contribution rate - EE) in the market. The names of the companies are denoted by variables due to the confidentiality of the information.

Table 4. Comparison of Contribution rates in the Pension market

COMPANY	EE	ER	Total
BL	10.0%	20.0%	**30.0%**
AC	14.0%	14.0%	**28.0%**
AD	0.0%	25.0%	**25.0%**
AE	7.5%	15.5%	**23.0%**
AL	5.0%	16.0%	**21.0%**
AG	10.0%	10.0%	**20.0%**
AH	5.0%	13.0%	**18.0%**
AJ	5.0%	12.5%	**17.5%**
AK	7.5%	10.0%	**17.5%**
AZ	5.0%	10.0%	**15.0%**
AR	5.0%	8.0%	**13.0%**
AU	5.0%	5.0%	**10.0%**
Average	**6.6%**	**13.3%**	**19.8%**

CHAPTER FIVE: DISCUSSION OF RESULTS

5.1 Introduction

In this chapter, the study transitions from the presentation of empirical findings to a comprehensive discussion and interpretation of the results. The primary objective of this research was to assess the effectiveness of current pension provisions and to explore the multifaceted dimensions that contribute to the concept of pension adequacy.

5.2 Objective 1: Calculation of the current income replacement rates that can be achieved by the Pension Scheme (for its members) under the status quo

The income replacement rates attained at the current contribution rate of 10% ranged between 3.5% and 37% which is below the international target of between 65% and 85%. This entails that the pension under the status quo cannot guarantee a decent life to its members upon retirement.

The reasons for the low replacement rates are:

i. Discontinuance of paying contributions by the non-contributory members. This can have significant implications for the financial stability and sustainability of a pension scheme, potentially affecting the benefits and contributions for all members of the scheme. The contributions play a crucial role in funding the pension benefits, and the reduction in contributions may decrease the overall pool of funds available for pension pay-outs due. This could impact the scheme's ability to meet its financial obligations, potentially affecting the adequacy of pension benefits for all members.

ii. The relatively low total contribution rate of the Pension Scheme may result in insufficient funds accumulated over the working years, leading to lower retirement income for members. This can impact retirees' ability to maintain their desired standard of living during retirement (Mustafa, Artan, 2021). It may also increase the reliance on government support or social safety nets provided for retirees, putting additional pressure on public finances. The average mandatory pension

contribution rate for an average earner across the 35 OECD countries with designated pension contributions was 18.2% in the year 2020, OECD (2020).

iii. 22 members out of a total membership of 34 are aged 40 years and above that is they have relatively less time to save for retirement. Novy-Marx and Rauh (2011) stresses out the importance of entry age when calculating the individual pension entitlements. The majority of the members of the scheme had lower IRRs due to the shorter periods for saving for their retirement into the fund, which implies having inadequate benefits at retirement.

Therefore, the low IRRs under the current conditions of the scheme were due to the reasonings highlighted above and were reviewed in to determine the conditions that will help improve the IRRs of the scheme members specifically the contribution rate and retirement age.

5.3 Objective 2: Review of the adequacy of the member and employer contribution rates (towards retirement savings) to deliver a decent pension at retirement

In order to determine the adequacy of the scheme, scenario analyses were conducted under the following assumptions;

Scenario 1: Increase total contribution rate to 15%

Scenario 2: Increase total contribution rate to 20%

Scenario 3: Increase total contribution rate to 25%

Scenario 4: Increase NRA to 65 and total contribution rate to 25%

The scenarios showed that change in the total contribution rate had a notable effect on the IRR. The results presented in figure 4 to figure 6 show that as the contribution rates were increasing from 10% up to 25%, the IRR consequently increased. Scenario 4 not only took into account the increase of the contribution rate but also the NRA, which was increased to 65. The results in figure 7 showed that the number of members in the IRR of above 60% had increased in comparison to the scenario were only the contribution rate was increased to 25%. This was due to the fact that members in the older age group were given more time to save for retirement, and hence increasing the projected monthly contributions.

The International Labour Organization (ILO) establishes basic benchmarks for adequate pension levels, aiming to ensure a respectable quality of life during old age, Humblet and Silva (2002). As outlined in Convention No. 102, an old age benefit equivalent to 40% of past earnings is deemed satisfactory. On the other hand, the OECD aims for pension levels, encompassing both public and private pensions, that provide approximately 70% replacement of the final salary. The OECD emphasizes that "for individuals with low income, the retirement income level may need to be higher to be considered sufficient" (OECD, 2012).

Therefore, from the results of the scenario analyses it can be deduced that increments in the contribution rates and/or the retirement will improve the benefits that the retirees will receive at retirement.

5.4 Objective 3: Determination of the combined income replacement rates that can be achieved if the benefits from mandatory public pension scheme and that from the occupational scheme under the current conditions are allowed for.

Notably, from figure 9., after considering the benefits to be attained from the mandatory pension scheme and that from the pension scheme only nine members of the scheme fell the ranges above the IRR of 60%. The majority fell below the minimum target of 65%, which entails that most of the members of the scheme will get insufficient benefits and are likely to suffer old age poverty after retirement, assuming no other savings plan are taken up. OECD member countries (as in the case of the Netherlands, Italy and France) often have pension benefits that are above average due to higher pension contribution rates arising from both public and private schemes (OECD, 2021).

5.5 Objective 4: Review and compare the contribution rates under the Pension Scheme against other pension schemes.

A pension market research showed that some private schemes have total contribution rates of up to 30%, and an average of 19.8%. Therefore, the pension scheme with a contribution rate of 10% may need to be redesigned as “it is inadequate to ensure a decent pension in retirement” (Mustafa, Artan, 2021). The study shows that contribution rates are key in determining the efficacy of the benefits provided to the retirees by the

pension schemes, and so lower rates yields lower benefits in comparison to higher rates as shown in the scenario analyses.

5.6 Limitations of the research

The challenges faced during the research process were associated with constraints in data availability, time limitations, and other factors. The identified limitations are outlined below;

- **Data Collection**
  This proved challenging as most employers are not willing to avail the data as it contains confidential information.
- **Comparative Analysis**
  While the study provides an assessment of pension schemes in Zambia, it will not engage in extensive comparative analyses with pension systems in other countries (Borella et al. ,2009: Isaka et al., 2019)
- **Future Developments**
  The study will not account for potential future changes in pension schemes, regulations, or economic conditions beyond the knowledge cut-off date. Replacement rates are insufficient to demonstrate the progression of purchasing power throughout the entire retirement period (OECD, 2012, p.161).
- **External Factors**
  Economic conditions, inflation rates, and investment performance, among other external factors, can significantly affect the adequacy of pension benefits (ISG,2006). These factors may not be directly under the control of pension schemes or the study.
- **Complexity of the Issue**
  The study may not fully capture the multifaceted nature of benefits adequacy, as it involves various individual circumstances, financial planning strategies, and retirement choices that can be challenging to quantify comprehensively.

- **Policy Implementation**

  While the study may propose policy recommendations, the actual implementation of these recommendations and their effectiveness in improving benefits adequacy may be subject to political, administrative, and economic consideration.

CHAPTER SIX: CONCLUSIONS AND RECOMMENDATIONS

6.1 Introduction

This chapter of the study presents the conclusion drawn from the empirical results discussed in the previous chapters, and the recommendations of this research.

6.2 Summary

Improving the pension systems is one of the aims of the policy initiatives that decision makers are focusing on to address old age poverty in Zambia. Pension adequacy was defined as the extent to which the scheme provided benefits that are sufficient to meet the financial needs of retirees and enable them to maintain a desired standard of living during their retirement years. The study aimed at determining the adequacy of benefits provided by occupational pension schemes in Zambia in meeting the income needs of pensioners during retirement years.

The study assessed the adequacy of retirement benefits under the Atlas Copco Pension Scheme as at 31 December 2022, and it was established that under the status quo of the pension scheme the income replacement rates for its members were below the target of between 65%-85% (according to global best practice). The analysis of the expected replacement rates for the current members showed that the maximum estimated replacement rate based on the current contribution rates and assumptions noted in chapter four and five of the report, is 37%. This low amount of benefits from the Pension Fund was validated by the low contribution rates compared to other industry participants.

However, the study also showed that the National Pension Scheme benefits improve the final expected replacement rate. Therefore, this implies that the members' benefits and cost of these benefits should be considered on an aggregate basis. Additionally, the research revealed that increase in the total contribution rates improved the IRR.

6.3 Conclusions

In a nutshell, the expressed concerns from the general public regarding the efficacy of Pension Funds in Zambia are valid. While pension funds aim to safeguard the worth of members' contributions, the actual returns fall short of expectations. The study findings showed that under the current conditions of the scheme, i.e. a total contribution rate of 10, the scheme yielded IRRs that were below 37% which is way below the international target of between 65% and 85%, making the retirement income of the pensioners inadequate. A scenario analysis, increase of the contribution rate to 25%, yielded better IRRs with 8 members falling in the bracket of an IRR of above 60%. Another scenario analysis conducted, increasing the total contribution rate to 25%, which will increase the amount set aside for retirement, and increasing the normal age of retirement to 65 for the members of the Scheme, which would give the members more time to save for retirement, improved the IRRs making the scheme benefits adequate for most of its members. Therefore, with the drastic changes in the economic sphere, to enhance participation and confidence in Pension Schemes in Zambia, policymakers and Fund Managers must reconsider the conditions of the pensions and investment strategies to ensure the delivery of sustainable income during retirement.

Furthermore, it was noted that the benefits of the occupational scheme need to be considered on an aggregate basis with the National Pension Scheme benefits as there was an improvement in the IRRs with 7 members falling in the bracket of an IRR of above 60% when the benefits were aggregated. Therefore, with an increase in the IRRs of the pension scheme (by increasing the contribution rate to 25%) the aggregate benefits will be more adequate for the members making their retirement income more sustainable.

6.4 Recommendations

Based on the results and conclusions drawn from the study, the following recommendations are being proposed;

According to the findings, increasing the contribution rates would result in the improved targeted retirement benefits from the Fund. A total contribution rate of 25% and above is required in order for the Occupational Pension Scheme to achieve the target benefits with

income replacement rates of 65% – 85%. It was also noted that considering the benefits from the Occupational Pension Scheme and the National Pension Scheme in aggregate improved the final expected replacement ratio, and therefore with the target set out above, the aggregate benefits receivable by a pensioner will help provide financial sustainability during retirement. In addition to the above, it was observed that the current total rate of contribution to the Pension Scheme is low by industry standards. Some pension schemes have total contribution rates that are as high as 33% for replacement rates of about 73% of salary.

The study therefore, proposes that the target income replacement rate for the Atlas Copco Pension Scheme be set at this level by increasing the contribution rate to 25%, which in turn increases the benefits provided by the scheme to ensure members continue to be able to sustain their livelihoods after retirement. However, increasing the contribution rate can increase the costs (administrative and compensation costs) for the employers, which would have an effect on their hiring and compensation decisions. The increment can also lead to a reduction in the employees' take home pay. To minimize the impact on both employers and employees, a phased increase in contribution rates over a period of 4-6 years can be implemented with increases of 2-3 percentage points per year until reaching the target rate of 25%.

The Employer can additionally, consider introducing a defined ambition (DA), to ensure that all members achieve a certain minimum target benefit. DA is a hybrid plan that complements existing DB and DC schemes which aims to provide more certainty for individuals compared to DC and less cost volatility for employers compared to DB. While DC plans depend on investment returns and contributions, which can fluctuate, DA plans often provide a minimum benefit or guarantee, which can help participants feel more secure about their retirement income. From the findings of the study, it was noted that the benefits are solely affected by the contributions which are in turn affected by the inflation rate, investment return and salary inflation rate, and all investment risk is borne by the individual. Therefore, a DA scheme should be considered to improve the adequacy of the benefits from these schemes by provided an assured minimum benefit in addition to the

volatile contribution-based benefits. This however comes at an extra cost to the Employer, and introduces an open-ended liability which the Employer may not be willing to take.

6.5 Areas of Further Research

The key objective of this study was to determine and assess the adequacy of occupational pension plans in Zambia. However, this study does not address various facets of social security. It is imperative to note that additional research is required, including examining the various investment strategies employed by pension funds and evaluating their performance by assessing the impact of market conditions, risk management, and asset allocation on returns, examination of the fiscal implications of social security schemes, exploring cost-effective alternatives, enhancing post-retirement replacement rates, and assessing the feasibility of reverting to a defined benefit system for the country. Some of the research questions that can be examined are; How do different asset allocation strategies affect the long-term returns of pension schemes, considering the impact of market volatility? What are the best practices for managing investment risks in pension schemes, particularly in relation to market downturns and economic crises? What is the role of macroeconomic factors in determining the success of pension scheme investment strategies? How does asset allocation need to be structured to match the liabilities of pension schemes, considering factors such as retirement age, life expectancy, and inflation? Addressing these, can help pension schemes to effectively manage the pension assets and improve retirement outcomes for participants.

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