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Adequacy, Affordability and Sustainability of Pensions in Higher Learning Institutions in Zambia

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Abstract

Old-age poverty is as old as the human race, yet to this day, the fight against this beast rages. The fight against old-age poverty is certain, and so is the need to provide retirement income. The stakeholders of the University of Zambia (UNZA), Copperbelt University (CBU) and Mulungushi University (MU), particularly the government, expressed sustainability and affordability concerns over the existing pension systems in the three public universities. Eventually, the government directed the institutions to undertake pension reform to abolish second pillar plans. The study aimed to evaluate the adequacy, affordability and sustainability of pension systems at UNZA, CBU and MU. The study adopted a quantitative approach in which adequacy, affordability and sustainability indicators of the pension system were assessed considering data recorded within the last ten years. Survey questionnaires were used to gather data from 360 respondents. Data were analysed using SPSS Pearson correlations to evaluate the relationships between variables and sensitivity analysis techniques. Quantitative information was gathered from the financial statements of the universities over a ten-year horizon. The results indicate that the pension systems are adequate at the Zambian HDI of 64 but inadequate at the Sub-Saharan HDI of 69. On the other hand, affordability and sustainability performance indicators highlighted the financial stress the existing pension systems exert on the financial position of the three institutions. The pension liabilities grew by an annual average of 41% for UNZA, 19% for CBU and 35% for MU. In addition, the gearing ratios stood at 265% for UNZA, 248% CBU and 81% MU. Pension liabilities expressed as a proportion of current assets; the ratios stood at 841% for UNZA, 336% for CBU and 25% for MU. The liquidity indicators demonstrate the financial challenges the universities

face in paying retirees. The sensitivity analysis of the financial information projects continued growth of pension liabilities resulting in further delayed liquidation of pension benefits. Therefore, the study projects increased old-age poverty, which is detrimental to the performance and reputation of the higher learning institutions in Zambia. With the poor performance of key pension indicators, the public universities face the daunting task of reforming the existing models to fight old-age poverty. The fight against old-age poverty is a collective responsibility that should endeavour to improve the lives of retirees rather than exacerbate the situation as the directive to reform seems to cause in the public universities. The study recommends design concepts encompassing risk management, prefunding and key pension performance indicators as dictated by actuarial assumptions. Furthermore, the study recommends a pension model that embraces the critical key design principles that make the fight against old-age poverty easier without abandoning the financing mechanism.

Keywords

Adequacy, Pensions, Sustainability, Retirement, Poverty

1. Introduction

Old-age poverty is a universal problem that requires planning at both national and personal levels. Employers and employees have the opportunity to resolve this matter collectively. Moreover, old-age poverty is not selective, as every senior citizen is vulnerable. Higher learning institutions (HLIs) face the same challenges world-over. For instance, the higher learning institutions in China, Israel, Nigeria, the United Kingdom and the United States fight old-age poverty using various pension models (Ekwunife et al., 2019; EPF, 2017; EU Commission, 2017; Lin & Tin, 2018; NEA, 2016). In addition, the universities in these countries continue to undertake pension reform to alleviate old-age poverty. The existence of HLI associations, the NEA in the US and the UCEA in the UK, demonstrates the emphasis by stakeholders on providing adequate retirement income.

Like the HLIs in other countries, the public universities in Zambia are vulnerable to old-age poverty. The COVID-19 pandemic worsened the fight against old-age poverty particularly due to projected low yields from investments. Feher and de Bidegain (2020) state that the COVID-19 pandemic will impact plan assets performance, resulting in lower yields. The investment downturns consequently affect the pension benefits the retirees receive. With the public universities in Zambia already battling affordability, sustainability and adequacy issues, the onset of the COVID-19 pandemic worsened the old-age poverty fight. In addition, the public universities are lowly funded relative to their operations (Kalomo & Chiliba, 2022). Yohane et al. (2021) state that the public universities in

Zambia particularly the University of Zambia (UNZA), Copperbelt University (CBU) and Mulungushi University (MU), financial constraints prompted the Government of the Republic of Zambia (GRZ) to call for pension reform. Pensions were identified as the leading cause of the financial position havoc in the three public universities. Consequently, GRZ developed a New Financing Strategy for Public Universities in Zambia, intending to reform the pension systems at UNZA, CBU and MU. The strategy seeks to achieve affordability and sustainability of the pension schemes (Ministry of Higher Education, 2018).

The Organisation for Economic Development (OECD), the International Labour Organisation (ILO), and the World Bank lead the way regarding the need for adequate, affordable, and sustainable pensions (Durán-Valverde et al., 2022; Holzman et al., 2008; OECD, 2005, World Bank, 2008). Therefore, the desire to have an affordable and sustainable pension system at UNZA, CBU, and MU should not overshadow the need for adequate retirement income. Oyerogba et al. (2013) argue that nothing delights an employee's heart other than a fantastic, hassle-free retirement.

Several pension studies were conducted on the HLIs in Nigeria, the UK and the US. The studies focused on the colleges and universities of their countries. The research detailed the pension reform processes, the challenges and the risks arising from retirement systems offered by the HLIs. The studies were specific to their countries.

Therefore, this paper focuses on the adequacy, affordability, and sustainability of pension systems at UNZA, CBU, and MU. The study aimed to evaluate the adequacy, affordability, and sustainability of the pension system of the three higher learning institutions. The main research question is, "What is the performance of the existing pension systems UNZA, CBU, and MU?"

The rest of the paper is structured as follows: Section 2 presents the literature review. In Section 3, conceptual framework and hypothesis are explained. Section discusses the methodology. Section 5 presents the results, while Section 6 summarizes the findings and recommendations.

2. Literature Review

This section of the study defines pensions and gives an overview of the type of retirement plan. Next, the study discusses the types of pension system models and the pension reform experiences from a global perspective.

2.1. Pension Systems

Several authors define pensions differently, yet all point to the provision of regular retirement income during post-employment (IFRS Foundation, 2011; National Audit Office, 2016; Okpaise, 2005; Topoleski, 2018; Cambridge Dictionary 2019; International Labour Organisation, ILO, 2019). Pension benefits aim to secure a certain living standard during retirement. Blake (2000) states that a pension plan should maintain a reasonable living standard after retirement to

avoid old-age poverty and burdening society. In other words, a pension plan is every employee's future. Inevitably, people grow old, retirement becomes a reality, and they face the prospect of old-age poverty.

Therefore, retirement benefits support the notion that pension income is every employee's future. Employers and employees can choose defined contributions (DC) or defined benefits (DB) plans. Bodie et al. (1985) state that DBs and DCs vary significantly regarding risks, sensitivity to inflation, funding, and government supervision. However, a third option, known as collective defined contribution (CDC), is now available for participants (Kalwarski, 2015).

Defined Contribution Plans

A DC plan is a post-employment benefit plan that functions like a savings account. The employer pays fixed contributions to another entity (a fund) without further legal or constructive obligation to pay additional dues if the pension fund underperforms (IFRS Foundation, 2022; Iwry et al., 2021; Munnell et al., 2011). The employee assumes the investment risks meaning that if the plan suffers a financial loss, the value of the retirement savings erodes without further compensation from the employer (Watson, 2008). The key feature of a DC plan is that the percentage contribution rate may not remain fixed over time as it changes to reflect the dynamic environment (Bodie et al., 1985; Topoleski, 2018). The risks of the DC scheme lie with the employees since the employer's responsibility is to collect and remit the contributions to the fund manager (Bodie et al., 1985; IFRS Foundation, 2011; Watson, 2008).

Therefore, fund performance determines the pension benefit. The employer's liability is the unremitted pension contributions from the employee and employer. In addition, the obligation may include any penalties that arise due to delayed remittances. Consequently, a DC plan exposes the employees to investment risks.

Defined Benefit Plan

Bodie et al. (1985) describe a DB plan focusing on the flow of benefits that the scheme member will get upon retiring. International Actuarial Association (2018) states that the benefits are defined and guaranteed with no possibility for variation by either the employer or the governing body. According to Lightstone et al. (2018), private players primarily perceive DB plans as a promise with a sponsor. That promise is a financial obligation that is the sponsor's responsibility to fulfill. The particular sponsor in a DB is the employer. Thus, the employer's ability to maintain the plan is undeniably vital to the plan's performance and the final pension benefit.

According to Wang et al. (2014), the DB plan rewards long service, and most plans use the last salary to calculate the pension benefit. Consequently, this restricts the employees' movements from one employer to another because most DB plans are not transferable. International Actuarial Association (2018) states that DB plans are costly, requiring fundamental trade-offs between affordability and delivering certainty. DB plans are funded or unfunded.

Hybrid Plans: Collective Defined Contribution (CDC) Plans

Kalwarski (2015) defines a hybrid plan as anything other than a pure DB or DC pension plan. The Pew Charitable Trusts (2015) refers to a CDC as a plan that combines DB and DC plan elements. The employer and employee pay fixed contributions to the employee's savings account. The contributions are commonly referred to as money purchases (Eagle et al., 2020). According to Millard et al. (2021), a CDC is similar to a DB plan; however, the employer does not offer guarantees. Furthermore, a professional investor manages a CDC targeting to pay a percentage of final or average pay annually in retirement (Iwry et al., 2021; Millard et al., 2021). CDC plans are a backbone of the Dutch and the Danish system and have become more common in the US and Canada. In addition, CDC plans have been introduced in Germany, Japan, and the UK. In the UK, CDC plans have become the third option for employers (Millard et al., 2021; Iwry et al., 2021). According to Iwry et al. (2021), these variable benefit plans protect employers from potentially volatile funding obligations. Crucially, some of these plans do not guarantee benefits, while others incorporate a base assured DB component and a variable component. Therefore, hybrid plans reduce the cost of pension provision.

According to Turner (2014), the shift by most countries from DB to DC is because the employer bears the investment risk in the traditional DB. Moving to a DC scheme simply means transferring the investment downturns to the employee (NCPERS, 2011). Turner (2014) and Kalwarski (2015) argue that the advantage of the hybrid plan is the risk-sharing aspect. Both the sponsor and participant share the risks by combining the DC and DB elements in one scheme. Eagle et al. (2020) argue that CDC aims for higher investment returns for the in-retirement because the risk is shared between members over time. Consequently, the retirement benefits from CDC are higher than that of DB by around 40% (Eagle et al., 2020). In addition, CDC plans benefit from pooling members' retirement savings into a single fund and sharing investment and longevity risks (Eagle et al., 2020; Iwry et al., 2021; Millard et al., 2021). Since the employer does not bear the investment risks, CDC reduces the cost of pension provision in addition to better adequacy levels than DB and DC plans.

The Multi-Pillar Pension Models

Fighting old-age poverty is a complex process that requires a concerted effort from all stakeholders. To achieve the aim of a pension system, pillars are used to fight old-age poverty (Holzmann et al., 2008). ILO, OECD and the World Bank recommend different pillars. Borah et al. (2018) summarize the three pillar system as shown in Table 1 below.

The World Bank, ILO and OECD recommend a multi-pillar pension model, which addresses a pension system's adequacy, sustainability, equity, affordability, and predictability (Durán-Valverde et al., 2022; Holzman et al., 2008; OECD, 2005). The three organisations differ on the number of pillars or tiers but concur on the aim of a pension system to reduce old-age poverty.

Table 1. Types of pension pillar models.

Pillar	OECD (the EU)	The World Bank	ILO
0 Pillar		Non-contributory basic benefits financed by the state	State-funded social protection for older persons.
1st Pillar	Mandatory Publicly managed pension scheme	Mandatory Public DC schemes with minimum pension guarantee or flat benefit.	Mandatory DB, financed by employer and employee contributions.
2nd Pillar	Workplace pensions embedded in employment contract.	Mandatory occupational plan (funded DB) plan.	Complementary Pillar. Voluntary or mandatory, occupational or non-occupational.
3rd Pillar	Voluntary personal pension plan.	Voluntary personal savings plan or Occupational plan privately managed	Voluntary Personal Savings.
4th Pillar		Informal support	

Source: Borah et al., 2018.

The World Bank, ILO, and OECD have principles guiding pension reform strategies.

According to Holzmann et al. (2008), the World Bank's multi-pillar model recommends a group of six principles for pension reform evaluation. The principles include adequacy, affordability, sustainability, equity, predictability and robustness.

ILO pension model has a set of eight design principles which are: Principle 1: Universality; Principle 2: Social solidarity and Collective financing; Principle 3: Adequacy and predictability of benefits; Principle 4: Overall and Primary Responsibility of the State; Principle 5: Non-discrimination, gender equality and responsiveness to special needs; Principle 6: Financial, Fiscal and Economic Sustainability; Principle 7: Transparent and Sound Financial Management and Administration and Principle 8: Involvement of Social Partners and Consultations with other Stakeholders.

The significant difference between the two models is that ILO's principles are inclined toward social security. In contrast, the World Bank's principles are relevant to public and private pension plans. The OECD pension model is similar to the World Bank but recognizes tiers instead of pillars. Since this study focused on the public universities that enjoy both public and occupational pension schemes, the World Bank's multi-pillar model theory appeared more relevant to this study.

The World's Bank Conceptual Framework

The World Bank has been involved in pension reforms to avert old-age poverty since the 1980s. In the 1990s, the World Bank undertook a study entitled, Averting the Old Age Crisis, which consequently established the fundamental principles of the Conceptual Framework (Holzmann et al., 2008; Holzmann & Hinz, 2005).

The Word Bank Conceptual Framework's primary evaluation criteria consist of adequacy, affordability, sustainability, equity, predictability and robustness (Holzmann et al., 2008; Heneghan & Orenstein, 2019; Wang et al., 2014; World Bank, 2008). Therefore, the study focused on pensions' adequacy, affordability and sustainability because these are the common key indicators of pension system performance. Additionally, an adequate, affordable and sustainable pension system is predictable and robust by nature.

2.2. Performance of Pension Systems Adequacy

An adequate pension system provides retirement income to the members to prevent old-age poverty at a country-specific absolute level (Holzmann et al., 2008). Chomik and Piggott (2016) argue that poverty and adequacy are subjective depending on the community's needs and attitudes. For instance, developing countries define poverty based on the $1 - 2 a day poverty line. Chomik and Piggott (2016) note that income is the most common poverty measure in developed countries.

According to Stiglitz et al. (2010), income replacement rates (IRRs) measure the proportion of the pension to average or minimum wages. Grech (2013) identifies the degree of poverty alleviation and consumption smoothing as pension adequacy indicators. However, the most commonly used is the IRR (Grech, 2013). According to Grech (2013) replacement rate assesses how pensioners sustain their pre-retirement consumption levels after retirement. The recommended IRRs range from 70% to 80% (ILO, 2019, Lobel et al., 2019; World Bank, 2008).

Stiglitz et al. (2010) further argue that a standard budget adequate for goods and services for retirees can be created to measure poverty.

The study adopts the IRRs as the standard measure of adequacy because the beneficiaries' income can be easily measured using paid salaries.

Affordability

Holzmann et al. (2008) argue that a pension system should be within the financing capacity of individuals (members) and society. A pension system is not supposed to unduly displace other social or economic imperatives or have untenable fiscal consequences.

Peng and Wang (2017) measured the affordability of the state and public pension benefits in terms of the government's ability to pay the contributions based on the tax and revenue bases. Peng and Wang (2017) argue that unfunded pension liability and the absolute increase in unfunded retirement obligations is another way of measuring affordability. Peng and Wang (2017) further expressed the pension financing cost as a percentage of the tax and revenue bases. Peng and Wang (2017) further applied the annual required contribution (ARC) ratio to assess the employers' ability to meet the cost of pension provision. ARC is expressed as a percentage of the tax and revenue bases to measure the financial burden of pension provision. Peng and Wang (2017) applied the ARC ratio over a twenty-year cross-sectional study from 1992 to 2011.

In the UK, the National Audit Office (2021) states the treasury measures projected pension expenditures as a proportion of GDP over the next 50 years. The projected ratios range from 2% to 2.1%, expected to reduce to 1.5% between 2064 and 65. Newson and Bourne (2011) argue that measuring affordability solely on costs is a mistake since this is highly dependent on political will and policy priorities. The concept of fiscal space influences government expenditures. Fiscal space refers to the government's ability to provide financial resources for the desired purpose without prejudice to its financial position's sustainability (Heller, 2005). Therefore, if the government can finance public pensions without causing financial havoc on its balance sheet, then the system is affordable.

Sustainability

A sustainable system is financially healthy and maintained over a foreseeable horizon under a broad set of rational assumptions (Holzmann et al., 2008). Sustainability is measured by the liquidity indicator, which compares the income from contributions, financial assets, and pension expenditures in a particular year (Alonso-Garcia et al., 2017). This is expressed as follows:

$$LR_t = \frac{C_t + F_t^-}{P_t} \qquad (1)$$

where;

C_t represents the income from contributions at time t,

P_t represents the total pension expenditures at time t,

And t represents the value of the (buffer) fund at time t, also called the reserve fund, before new contributions and benefits payments are considered. The value of the fund at the time t after contributions and payments is given by:

$$F_t^+ = F_t^- + C_t - P_t \qquad (2)$$

The World Bank's Conceptual Framework highlights that pension reform is much more than adequacy and sustainability indicators. The framework points to the need for adequacy, affordability, sustainability, equity, predictability, and robustness in pension systems. However, affordability and sustainability are mostly preferred at the expense of adequacy, reducing retirees' recommended retirement income levels. As a result, the stakeholders frequently face the insurmountable task of balancing adequacy, affordability, and sustainability. Robustness and predictability are gradually achieved once the three indicators are attained. Therefore, the stakeholders in the public universities in Zambia must focus on providing adequate, affordable and sustainable retirement income.

Empirical Review

The inclination of this study was toward pension income adequacy of the existing pension systems at UNZA, CBU and MU. As stated by Holzmann et al. (2008), pillars are the modalities used to achieve the aim of pension; therefore, this study discusses the pension systems in HLIs in other countries for compara-

tive analysis. The selection was based on the volume of literature available for review. The comparative analysis is vital in comprehending how other institutions fight old-age poverty. Table 2 shows the pension pillar structure of HLIs in China, Nigeria, the UK, and the US.

The UK and the US have associations of universities and colleges that enhance a unit of purpose amongst the HLI. These associations play critical roles in reforming pension systems in the HLI. For example, in the UK, the UUK and UCEA collectively promote the interests of both the employees and employers in pension schemes (EPF, 2017; NEA, 2016; Thompson, 2008; UUK, 2021). The associations are committed to resolving the pension system challenges collectively.

Table 2 shows the developed economies' efforts to secure a comfortable post-employment life for retirees by having at least two active pillars. Additionally, having two schemes administered by two different fund managers helps manage the risk of financial loss. If one scheme is facing challenges, the retiree has an option to rely on another scheme. However, if the risk is not spread, the failure of the only scheme available increases the chances of old-age poverty. While Nigeria adopted the Chilean one-pillar pension system reformed in the 1980s, Chile enhanced its pension system by introducing a second pillar in 2017. Therefore, the two-pillar pension system is more effective in old-age poverty reduction than a one-pillar one.

Most studies on pensions in HLIs were undertaken outside the African continent. The countries that detailed the pension systems and reform processes are China, Nigeria, the UK and the US. The HLIs reform process focused more on achieving pension adequacy by complimenting the mandatory public retirement schemes with workplace pensions. From the African perspective, the studies in Nigeria focused more on reform processes than the performance of the pension systems. Therefore, a gap remains from the Zambian perspective regarding pension performance in public universities. This study becomes relevant in evaluating the performance of pensions in the HLIs in Zambia. More importantly, no studies have assessed the pension performance of HLIs in Zambia.

3. Conceptual Framework and Hypothesis

The World Bank's Design Principles influenced the conceptual framework for

Table 2. Pension systems in higher learning institutions.

Pillar	UK	USA	China	Nigeria
1	Basic Pension	Social security plus means-tested top-up	Old-Age basic pension	Mandatory DC Scheme
2	Mandatory workplace Pensions	Mandatory workplace Pensions	Occupational annuities	

Source: (Ekwunife et al., 2019; EPF, 2017; EU Commission, 2017; Lin & Tin, 2018; NEA, 2016).

this study. The Word Bank Conceptual Framework's primary evaluation criteria consist of adequacy, affordability, sustainability, equity, predictability and robustness. However, this study evaluated the performance based on adequacy, affordability and sustainability. Figure 1 below depicts the conceptual framework.

Hypothesis

The hypothesis for this study is summarized in Table 3 below.

4. Methodology

To achieve the aim of the study, the researchers employed quantitative research methods. Primary data was gathered from a sample of size 357 using survey questionnaires. The study adopted stratified random sampling from a population of 3287 from UNZA, CBU and MU. Each university was identified as a stratum due to geographical distribution. The cadres of staff sampled were management, academics, professionals and junior staff. The researchers used Ymane's formula with 95% confidence.
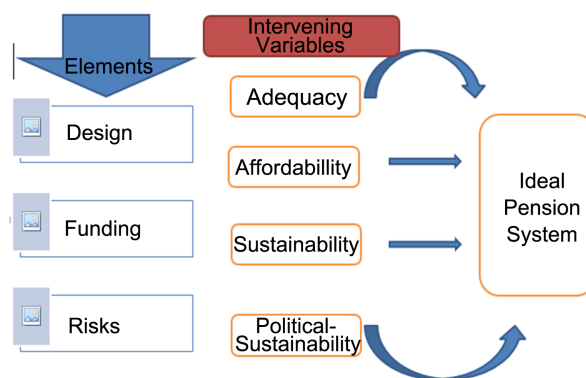
Figure 1. Conceptual framework (Source: Constructed by Author).

Table 3. Hypothesis.

Adequacy	H_0: Pension adequacy influences the design of a pension system
	H_1: Pension adequacy does not influence the design of a pension system
Affordability	H_0: Affordability is a key factor in pension reform
	H_1: Affordability is not a key factor in pension reform
Sustainability	H_0: Sustainability affects the performance of a pension system
	H_1: Sustainability does not affect the performance of a pension system
Political Sustainability	H_0: Political sustainability determines the funding of pension plans
	H_1: Political sustainability does not determine the funding of pension plans

Source: Author constructed.

Yamane's formula is expressed as follows:

$$n = \frac{N}{1 + Ne^2}$$

where n is the sample size and N is the population size. Therefore, with a study population of 3287, the sample size was calculated as follows:

$$n = \frac{3287}{1 + 3287 \times 0.05^2} \tag{3}$$

The data about the pension systems were gathered from the Collective Agreements (CAs). In addition, the study analyzed the performance of the pension system using the financial ratio techniques. The data was gathered from the ten-year financial statements, from 1st of the 1st of January 2009 to the 31st of December 2020, depending on the latest external audit reports. For UNZA, it was from the 1st of January 2009 to the 31st of December 2018, and for CBU, it was from the 1st of January 2010 to the 31st of December 2019. Finally, for MU, it was from the 1st of January 2011 to the 31st of December 2020. The financial ratio techniques assessed the adequacy, affordability and sustainability of the pension systems of the three public universities.

5. Results and Discussion

This section presents and discusses the results of the study. The study aimed to evaluate the adequacy, affordability and sustainability of the pension systems at UNZA, CBU and MU. Therefore the study will focus on the performance indicators rather than the pillar system in the three public universities. However, the paper briefly describes the pension pillar system existing at UNZA, CBU and MU compared to the other HLIs.

5.1. Pension System Existing at UNZA, CBU and MU

The CAs of UNZA, CBU and MU revealed that the three HLIs have a three-pillar pension system as per Table 4 below.

Table 4. Pension systems at UNZA, CBU & MU.

Pillar	UNZA	CBU	MU
1	Mandatory National Pension Scheme	Mandatory National Pension Scheme	Mandatory National Pension Scheme
2	Workplace Pensions - mandatory per CAs	Workplace Pensions - mandatory per CAs	Workplace Pensions - mandatory per CAs
3	Voluntary - Life policies & Insurance related products	Voluntary - Life policies & Insurance related products	Voluntary - Life policies & Insurance related products

Source: Author constructed.

The CAs for the three public universities revealed that UNZA, CBU, and MU run a mandatory two-pillar pension system. This is consistent with the pension systems existing in the higher learning institutions in China, Israel, the UK, and the USA, except for state universities in Nigeria, which run one pillar pension system (Ekwunife et al., 2019; EPF, 2017; EU Commission, 2017; Lin & Tin, 2018; NEA, 2016). Furthermore, while Nigeria adopted the Chilean one-pillar pension system reformed in the 1980s, Chile enhanced its pension system by introducing a second pillar in 2017.

Pillar 1 is for the state-run social compulsory protection scheme for the working class. National Pension Scheme, administered by National Pension Scheme Authority (NAPSA), is a contributory plan for employers and employees. However, this is a DB scheme with the benefits defined at 40% of annual national average earnings (NAE). The employer and the employees contribute 5% each, capped to the maximum of 40% of the NAE. Pillar 2 accommodates mandatory workplace pensions per the CAs of the three public universities. These are primarily unfunded DBs funded by subventions from the Government of the Republic of Zambia (GRZ). The employers defined obligation rates range from 25% to 50%, with UNZA paying the highest and MU on the lower end. The results from the survey questionnaire show that 3% of the sample have additional voluntary savings in either life policies or insurance-related products. Therefore, a third pillar exists in a few individuals who have taken personal responsibilities towards their retirement.

Therefore, a mandatory two-pillar pension system exists at UNZA, CBU and MU. The two-pillar pension system demonstrates the universities' desire to provide adequate retirement income like the other HLIs of other countries. Holzmann et al. (2008) state that pillars are modalities of fighting old-age poverty; therefore, UNZA, CBU and MU are consistent with this approach. A three-pillar pension system exists in 3% of the surveyed population, which shows that fighting old-age poverty is a collective and personal responsibility. Therefore, the stakeholders in the three HLIs must encourage the staff members, especially the highest earners, to consider additional voluntary savings.

5.2. Adequacy

The study undertook a sensitivity analysis to assess adequacy levels using IRRs as the indicator. Table 5 below shows IRRs at life expectancies of 64 (Zambia HDMI), 69 (Sub-saharan HDMI) and 75.

The pension system of the three public universities provides the recommended minimum 70 percent to 80 percent IRRs using the life expectancy of 64. The adequacy levels remain within the recommended 70 percent to 80 percent using the Sub-Saharan average life expectancy of 69 for employees serving at least 20 years for UNZA. Therefore, the staff members at UNZA can live a reasonably comfortable retirement based on the replacement ratios at the life expectancies of 64 and 69. Retirees at CBU can attain an IRR of at least 70 percent after

Table 5. IRRs for UNZA, CBU & MU.

Details	64 Life Expectancy				69 Life Expectancy				75 Life Expectancy			
Years	15	20	25	30	15	20	25	30	15	20	25	30
UNZA	133%	170%	207%	244%	59%	71%	83%	96%	37%	43%	48%	53%
CBU	122%	155%	188%	221%	56%	67%	78%	89%	37%	42%	46%	51%
MU	102%	129%	155%	181%	47%	55%	63%	72%	33%	36%	40%	43%

Source: Author constructed.

working for 25 years. Retirees from MU fall below the recommended 70 percent even after working for 30 years. According to Lobel et al. (2019), with an IRR below 70 percent, retirees are presumed to be experiencing old-age poverty. The pension system at MU is the least rewarding at the age of 69, and old-age poverty seems inevitable. Considering that 36 percent of the staff members that participated in the survey prefer an IRR of 80 percent or more, the public universities' pension systems are attractive packages up to the life expectancy of 69. Therefore based on the results and Sub-Saharan HDI of 69, UNZA, CBU and MU provide the recommended minimum IRR of 70 percent (Lobel et al., 2019).

5.3. Affordability

The affordability of the pension systems at UNZA, CBU and MU, was assessed based on the capacity to fund the contributions compared to the revenue base or financing means (Peng & Wang, 2017; Holzmann et al., 2008). Furthermore, the financial ratio analysis technique was used to interpret pensions' impact on public universities' performance.

The financial statements show that UNZA, CBU and MU do not raise sufficient financial resources to sustain their operations, let alone prefund the pensions. Since the revenues generated by the public universities were insufficient to meet the operational needs, the institutions operated at deficits. Table 6 below summarizes the key profitability ratios analyzed in this study.

The three public universities operated at deficits during the ten years analyzed. UNZA had the highest deficit of K555.28m, CBU at K126.31m and MU had the lowest average deficit of K9.38m. The profit margins for the three universities were −112 percent for UNZA, −51 percent for CBU and −7 percent for MU. The deficits could have been higher without the government's financial support, considering that UNZA received 42 percent of its revenue from GRZ, CBU earned 30 percent and MU 16 percent. The total costs of the universities are more than the revenue generated, meaning that the universities are financing their operations through debt or credit facilities. For instance, the operating costs for UNZA are 212 percent more than the total revenue, 151 percent for CBU and 107 percent for MU. A higher operating cost margin indicates challenges in controlling costs. Evidently, the three public universities are living beyond their means. Though public universities are non-profit organisations, the

Table 6. Key performance indicators of affordability.

Details	Ten Year Averages		
	UNZA	CBU	MU
	K'm	K'm	K'm
Revenue	492.17	269.23	115.79
Total Costs	1047.45	395.55	125.17
Deficit	−555.28	−126.31	−9.38
GRZ Grants	208.64	80.82	18.32
GRZ Grant Revenue Contribution	42%	30%	16%
Profit Margin	−112%	−51%	−7%
Operating Cost Margin	212%	151%	107%
Staff Costs	729.61	275.5	79.21
Staff Costs/Total Costs	70%	70%	63%
Pension-related costs	256.84	48.11	10.42
Pension costs/Revenue Ratio	63%	19%	9%
Pension costs/Staff Costs	35%	17%	13%
Pension costs/Total Costs	29%	12%	8%

Source: Author constructed.

high operating cost margin raises questions about the capabilities of the institutions to control costs. The high deficits contribute to three public universities' existing high debt levels.

Identifying the main cost drivers is vital in reducing operating deficits. The financial statements show that staff costs make up 70 percent of the operational costs for UNZA and CBU, while for MU, they make up 63 percent. If the universities control the staff costs, they can gradually reduce the operating deficits. Furthermore, pension costs make up 35 percent of the total costs for UNZA, 17 percent for CBU and 13 percent for MU. The pension-related costs consume 63 percent of the revenue for UNZA, 19 percent for CBU and 9 percent for MU. The three institutions incur high staff costs, and accrued pensions are part of that. Once management controls the staff costs, the operating deficits will reduce, and the reliance on debt gradually decreases.

5.4. Sustainability

A sustainable pension system is paramount in fighting old-age poverty. The study evaluated the sustainability of the pensions system at UNZA, CBU and UNZA using financial ratios. Table 7 shows the liquidity indicators of the three public universities.

Table 7. Sustainability of pension systems at UNZA, CBU & MU.

Statement of Financial Position	UNZA	CBU	MU
Year	2018	2019	2020
	K'm	K'm	K'm
Non-Current Assets	1254.04	309.81	321.9
Current Assets	223.43	209.32	93.78
Total Assets	**1477.48**	**519.13**	**415.68**
Non-Current Liabilities	1051.05	21.03	202.62
Current Liabilities	4780.62	1583.26	162.79
Total Liabilities	**5831.67**	**1604.28**	**365.41**
Pension Related Debt	3636.02	376.3	35.82
Average ratios			
Current Ratio	0.12	0.11	1.44
Total Debt/Assets Ratio	265%	248%	81%
Long-term Debt/Assets	78%	3%	59%
Pension Debt/Total Liabilities	56%	28%	7%
Pension Debt/Current Assets	841%	336%	25%
Pension Debt/Total Assets	160%	69%	5%
Pension-Related Debt Growth	41%	19%	35%

Source: Author constructed.

The three public universities' current (short-term liquidity) ratios fall below the recommended 2 to 1. However, MU has a better average ratio of 1.44 to 1 than UNZA and CBU. Practically, the institution can pay its current liabilities on demand. Unlike MU, the liquidity ratios for UNZA and CBU are similar at 0.12 to 1 and 0.11 to 1, implying that the two institutions can pay only 12 percent and 11 percent of their current liabilities. This explains the perennial liquidity challenges the two (2) institutions face. More notably, the pension-related debt falls under current liabilities, meaning MU can pay retirees more quickly than UNZA and CBU. Nevertheless, the pension-related debt for the three institutions continued to grow, with UNZA owing K3.64 billion as of December 2018 and CBU K376.30 million as of December 2019. MU owed K35.82 million at the end of December 2020. The pension-related debt constitutes 76 percent of the current liabilities for UNZA, 24 percent for CBU and 22 percent for MU. The low current ratio of 0.12 to 1 and 0.11 to 1 implies that retirees must wait for their pension benefits until funds are available. However, the government plays a major in paying UNZA and CBU retirees. UNZA received K269.64 million and K150 million government-guaranteed loans to liquidate pension-related debt during the ten years to December 2018.

Additionally, the interview disclosed that the university received K150 million

towards a targeted K200 million to liquidate pension-related between 2020 and 2021. CBU received K42.51 million in government grants and K62.9 million in government-guaranteed loans to pay off retirees. The financial statements for MU do not disclose receipt of government grants specific to dismantling pension debt. Despite the government's efforts to pay retirees, pension liabilities continued to grow, and the debt situation persisted.

NAPSA's debt was 51 percent of the pension debt (K1.84 billion), and 49 percent (K1.79 billion) was for employer DB plans. More worryingly for UNZA is the chronic growth in the NAPSA debt which infers that the retirees may face challenges in receiving the basic retirement income. The overdue NAPSA debt explains UNZA and CBU's penalties for non-remittance of pension contributions to the social security scheme. Consequently, the NAPSA penalties increase operational costs, hence increasing operating deficits. MU's ten-year average current ratio is 1.44 to 1. However, by the end of 2020, the ratio had dropped and stood at 0.58 to 1. This indicates that the institution now faces financial challenges though not at the magnitude of UNZA and CBU. More notably is pension-related growth from K5.35 million in 2011 to K35.82 million in 2020. Therefore, there is a possibility that retirees at MU may have to wait for the retirement benefits like at UNZA and CBU.

The long-term insolvency of the three public universities was assessed using the total debt/assets ratio and long-term debt/total assets (BPP, 2018; Elliot & Elliot, 2019). The total debt to assets ratio for UNZA was 265 percent, CBU 248 percent and MU 81 percent. The meaning of this ratio is that the total debt for the University of Zambia was 2.65 more than the assets owned by the institution. Therefore, if all creditors demand immediate payment of their bills, the assets of UNZA are insufficient to settle their dues. Furthermore, pension debt was 160 percent more than the university's assets. This means that if UNZA is to liquidate the pension-related debt from its assets, the value of what the institution owns is insufficient to pay the accumulated staff benefits.

Likewise, Copperbelt University does not have sufficient assets to pay all its liabilities on demand because they are 2.48 times more than the assets. Although CBU faces long-term liquidity issues, the pension liabilities are 69 percent of its assets. This means the institution has sufficient assets to pay all staff benefits if required.

MU's total debt/assets ratio is 81 percent, indicating that the institution is financially better than UNZA and CBU. Therefore, MU has more assets to pay off all liabilities. In addition, pension-related debt makes up 7 percent of the liabilities and is 5 percent of the total assets. Therefore, the risk exposure of MU is better than that of UNZA and CBU.

6. Summary, Conclusion and Recommendation

6.1. Summary

Firstly the results show that UNZA, CBU and MU run a two-pillar-pension sys-

tem to reduce old-age poverty through adequate retirement income. Furthermore, the number of pillars in the three public universities is consistent with the pension systems in the HLI system in the UK and the US (EPF, 2017; NEA, 2016). Therefore, the two-pillar pension system at UNZA, CBU, and MU is designed to offer better adequacy levels, reducing the impact of old-age poverty.

Second, the existing pension systems at UNZA, CBU, and MU achieve the recommended adequacy levels of 70% to 80% IRRs at a life expectancy of 64 and 69 (Lobel et al., 2019). However, the average IRR for MU is below the 70 percent threshold at age 69. Therefore, the existing pension systems provide adequate retirement income for retirees in the three public universities. In addition, the study confirms that DB plans reward loyalty (Lobel et al., 2019; Wang et al., 2014). However, the real value of the retirement income erodes over time due to payment delays of up to 10 years. Consequently, the adequacy reduces, old-age poverty becomes a norm, and inevitably early deaths.

Third, the results reveal that pension systems in the three public universities are not affordable. UNZA, CBU and MU operated at a deficit during the ten years. Moreover, the accrued pension costs comprised a massive part of the personnel emoluments. In the case of UNZA, they are 63% of the revenue, 19% CBU and 9% of MU. The accrued penalties on the NAPSA scheme demonstrate the universities' financial challenges in liquidating the pension liabilities. Therefore, based on the financial performance of the three universities, the existing pension schemes are not affordable under the current conditions of the public universities.

Fourth, the results indicate that the existing pension systems in the three HLI raise sustainability concerns. This is evidenced by the delayed payment of benefits to retirees. For instance, retirees at UNZA and CBU wait between five to 10 years before receiving their benefits from the unfunded DB plans. However, the situation is different at MU, where the benefits are paid in less than six months from retirement. The challenges are not limited to the DB plans but to NAPSA, funded by payroll deductions. NAPSA debt grew over the ten years, with the public universities accruing interest and penalties on unremitted payroll deductions. Lack of non-compliance to the Pensions Act may result in delayed receipt of pension benefits, thereby increasing old-age poverty.

The three public universities are technically insolvent due to high debt ratios. The total debt to assets ratio for UNZA was 265%, for CBU 248% and MU 81%, meaning that the assets are insufficient to liquidate the total debt owed by the institutions. In the case of UNZA, pension liabilities are 160% more than the assets and 69% of assets at CBU. Based on the results, pension liabilities are the major contributor to the debt crisis in the three public universities. Therefore, the sustainability liquidity indicators indicate that the existing pension systems in the three public universities are not sustainable.

6.2. Conclusion

The study aimed to evaluate the adequacy, affordability and sustainability of the

pension system at UNZA, CBU and MU. The study revealed that retirement income is adequate, up to a life expectancy of 69 for UNZA and CBU based on the IRRs that are above 70%. However, the pension income for retirees at MU is adequate at 64 years and inadequate at 69 as the IRRs fall below 70%. Moreover, the pension income is inadequate across all the universities at age 75. This indicates the possibility of old-age poverty based on IRRs ranging from 43% to 53%, even for staff members who have worked for more than 30 years. If not addressed, the mortality beyond 75 can be termed the curse of long life for UNZA, CBU and MU retirees. Furthermore, the perennial delays in liquidating pension liabilities and the accrued NAPSA penalties indicate that the universities are battling with financing retirement schemes. Though adequate at age 64 and 69, the delayed receipt of pension benefits erodes the value of money since the retirement income is not indexed for inflation or cost of living adjustment. Therefore, pension benefits lose their initial value, reducing the adequacy indicators. Consequently, the fight against old-age poverty for the retirees of public universities persists. It appears the pension systems are beyond the financing mechanism of the sponsors.

6.3. Recommendations

The study makes the following recommendations which the stakeholders must consider in undertaking pension reform:

1) Due to the perennial deficits and growing pension liabilities, policymakers must consider the financing mechanism of the pension systems. This will reduce the retirees' waiting period and reduce old-age poverty.

2) Public universities should reform to a more sustainable, affordable, and adequate pension system. This will automatically reduce operations costs and lowers pension liabilities accumulation rate. Consequently, retirees will be paid timely due to the reduced financial needs.

3) The need for a more affordable and sustainable pension should not overshadow the importance of adequate pension income. Government and the policymakers of the three public universities must appreciate that pension income aims to fight old-age poverty. Therefore, there is a need to target IRRs of at least 70% deliberately. This could be done by encouraging employees to take responsibility for their retirement and supplementing the employers' efforts through voluntary additional retirement savings.

4) Multi-pillar pension system makes it easier to fight old-age poverty. The literature revealed that most higher learning institutions offer at least a two-pillar pension system. This strategy better manages the risk of financial loss than a one-pillar pension system. Therefore, the stakeholders in public universities should consider the risks of a single-pillar pension system. Additionally, voluntary additional pension savings indicate that staff members take retirement planning seriously and are ready to take personal responsibility. Therefore, UNZA, CBU and MU stakeholders must encourage staff members to participate in vo-

luntary additional pension savings through retirement planning awareness. The fight against old-age poverty is a collective responsibility.

Conflicts of Interest

The authors declare no conflict of interest regarding the publication of this study.

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