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# The role of actuarial accounting in enhancing the financial sustainability of companies listed on the Nasdaq stock market

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## Abstract

This study explores the application of actuarial accounting to enhance financial sustainability of the companies that are registered on the stock exchange Nasdaq during the years 2020 to 2024 by measuring long-term liabilities regarding employee benefits according to the standard IAS 19. The goal of this study is to analyze the significance of actuarial accounting in estimating the liability in future years. Moreover, it offers reliable accounting information that assists the management as well as investors to make sound financial decisions. Above all, it contributes towards the borrowing capacity of companies.

The research utilized a descriptive-analytical approach, this descriptive-analytical approach allows to describe and analyze the causal relationship of accounting with its financia. The data utilized in this study includes financial data as well as the actuarial data on respondent companies. The use of panel data over five years helped in identifying trends and variables over time. To estimate the impact of actuarial variables (employee life expectancy, salary increase rate, and employee turnover rate) on long-term liabilities, we analyzed the data using quantitative statistical methods (descriptive analysis, Pearson correlation coefficient, and regression analysis).

The results of the study indicated a strong, significant, and positive correlation between all actuarial variables and long-term liabilities. The improvement of financial disclosure took place through the use of accurate actuarial estimates that support future planning and management of financial risks as well as financial sustainability of firms. Additionally, life expectancy and salary increase rate of employees have the most significant impact on liabilities whereby employee turnover also has significant impact but less compared to the former two.

Given this finding, it is recommended to strengthen the application of actuarial standards on accounting measurement and disclosure, as well as implement sustainable policies for the management of long-term liabilities for financial sustainability and transparency and credibility on the financial statements.

**Keywords:** Actuarial Accounting, Financial Sustainability, Long-Term Liabilities, IAS 19.

## Introduction

Due to global economic upheavals and the ongoing financial crisis, measuring future liabilities has become one of the foremost challenges for large corporations, especially those listed on developed financial markets such as NASDAQ. Financial sustainability has become paramount. Today, it is more than just an indicator of a company's finances. In fact, financial sustainability is an essential benchmark for investor confidence as well as assess a company's ability to continue and grow in the future. From this point of view, actuarial accounting has become an advanced tool that applies statistical, mathematical and accounting sciences to determine long-term liabilities, especially employee benefit and pension obligations, thus enabling a more accurate reflection of future financial risks. In the long run, it will enhance the credibility of financial information.

The process of preparing accounting estimates is brought more rigour and precision by International Accounting Standard IAS 19. The actuarial foundations and methods for the preparation of accounting estimates that are accurate and comparable are provided by it. In this case, this study aims to examine the role of actuarial accounting in improving the financial health of companies in the NASDAQ stock exchange and to find out whether actuarial assumptions such as life expectancy of employees, salary growth rates, employee turnover rates, etc. contribute to improvement in the quality of future accounting measurements.

This study is unique for integrating actuarial accounting theory with practices of leading global companies based on current financial and actuary data from 2020-2024, which aims to provide the suitable result that complements the academic field with

reliable and accurate results and offers practical recommendations to assist policymakers and investors. With this methodology, the study fills an important gap in accounting literature. Further, it offers an applied model that can be used in financial markets across the world.

## Section One: Research Methodology and Previous Studies

### Research Methodology:

### First: Research Problem:

More and more large companies and institutions love financial sustainability as measuring stick for their continuity, many organizations are struggling to measure long-term liabilities accurately and objectively, as employee benefits and retirement obligations are creating real pain.

Actuarial accounting is the most modern tool authorized by International Accounting Standard IAS 19 that can eliminate this deficiency by providing accurate estimates of future risk and corporate liabilities, thus enhancing the objective of sustainable financial planning. This gives rise to the inquiry.

How far Do you think actuarial accounts could take us to measure Long-Term liabilities and improve financial sustainability of listed firms in financial markets?

### Second: Research Hypotheses:

The core assumption or hypothesis on which the.

Actuarial assumptions (life expectancy, salary increase rate, employee turnover rate) have a significant positive impact on improving long-term liabilities measurement and financial sustainable of JSE listed companies. Hence the following sub-hypotheses.

Sub-hypothesis 1: The life expectancy of employees has a statistically significant positive effect on long term liabilities of financial companies listed on Nasdaq which shows the important role of actuarial assumptions in measuring the sustainability of such companies.

Sub-hypothesis 2: A significant positive relationship exists between salary increases and long-term liabilities. This indicates the necessity to estimate future wages on an actuarial basis in accordance with IAS 19 for financial sustainability.

Sub-hypothesis 3: Employee turnover has a positive and statistically significant effect on the long-term liabilities of levered firms and thus larger future liabilities.

**Third: Research Objectives:**

The purpose of this research is to:

1. The objectives of the actuarial valuation of employee benefit obligations according to IAS 19 are the demonstration of the role of actuarial accounting in the measurement of such liabilities and the measurement of impact of the use of actuarial methods and models in improving the accuracy and reliability of liabilities estimation.
2. To assess how actuarial valuation influences the quality of accounting information in financial statements.

**Fourth: Significance of the Research:**

This research work is considered very important that is scientific and practical. The research work contributes to the enrichment of literature with respect to actuarial accounting and also with respect to IAS 19. It also clarifies the impact of this standard on the improvement of the quality of financial information. Studies also help to assess the relationship between the actuarial assumptions and the financial sustainability of companies listed in developed financial markets, NASDAQ, etc. To put it practically, the research provides tools and indicators that enable management to measure long-term liabilities more accurately and make rational decisions. As a result, any disclosures made by firms will be more transparent thanks to works by the IFRS. The findings offer practical recommendations for achieving long-term financial sustainability, the researcher states.

**Fifth: Research Population and Sample:**

**1. Research Population:**

The population of this research is all companies listed on the NASDAQ stock with the application of International Accounting Standard 19 (IAS 19) for the measurement and disclosure of employee benefits during the period 2020 and December 31 2024. This population is chosen because NASDAQ market compliance with international standards and regular financial disclosure is at a high level.

**2. Research Sample:**

A purposive sample of ten firms listed on the NASDAQ stock exchange were selected for a period of 5 years to arrive at 50 observations:

1. Listing is done constantly throughout the study period.
2. Annual financial reports should regularly disclose employee benefit obligations.
3. Application of IAS 19 for measuring and accounting disclosure Third: Approach to Investigation.

Descriptive-analytical method suitability with research nature, the study adopted it as the method of research. The actuarial measurement refers to the description of employee benefit obligation by the actuary. The analysis of causal relationships between research variables was carried out by using the appropriate statistical method. One of the most widely utilized methods in quantitative applied accounting studies is this method.

### Seventh: Research Model:

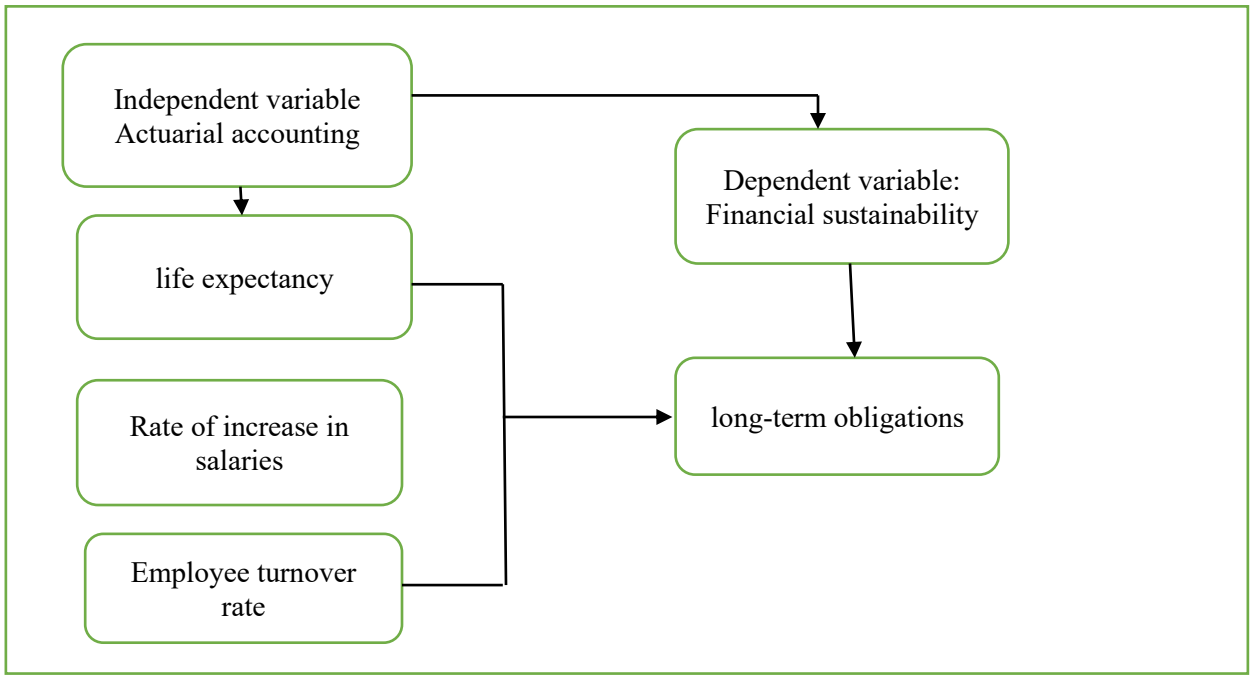


Figure (1) Research Model

## Section two: Previous Studies and What Distinguishes the Current Research

### First: Previous Studies:

The objective of this study is to review and analyze the most important previous studies covered by actuarial accounting and International Accounting Standard (IAS 19), in order to identify modern research trends and the existing scientific gap. The next table outlines the analytical summary of these studies with respect to aim, methods, results, and added value, before proceeding to position the current study in this perspective.

Table (1) Summary of Previous Studies

| No. | Author / Year | Study Title | Objective | Methodology & Tool | Sample & Field of Application | Key Findings | Scientific Contribution & Research Gap |
|---|---|---|---|---|---|---|---|
| 1 | Selimović & Veledar (2021) | Impact of IAS 19 Actuarial Calculations on Financial Performance | To measure the effect of IAS 19 actuarial calculations on financial performance | Quantitative analytical approach – correlation and regression | Public companies – Bosnia and Herzegovina | No significant negative impact; improved reliability of financial statements | Did not address long-term financial sustainability |
| 2 | Nadal (2025) | Assessing the Effects of IAS 19 on Organizational Performance | To evaluate the impact of employee benefits on organizational performance | Mixed-method approach – questionnaire and interviews | 40 employees – Malawi | Improved job performance due to employee benefit packages | Absence of long-term actuarial and financial analysis |
| 3 | Shahwan (2024) | Importance of Actuarial Accounting in Insurance | To highlight the role of actuarial accounting in risk management | Descriptive analytical approach – questionnaire | 291 respondents – Jordan | Improved quality of financial reporting | Did not test IAS 19 or financial sustainability |
| 4 | Ogungbenle (2022) | Conditions for Pension Liability to Become Zero under IAS 19 | To analyze the effect of actuarial assumptions on pension liabilities | Quantitative approach – hypothetical actuarial model | Hypothetical scenarios | High sensitivity of liabilities, which may reach zero | Did not link findings to disclosure or financial sustainability |
| 5 | Abdi (2024) | The Role of Actuarial Accounting in Enhancing the Quality of Accounting Information | To analyze the impact of actuarial accounting on the quality of accounting information | Descriptive analytical approach – SPSS | 102 accountants – Iraqi insurance companies | Statistically significant positive effect on information quality | Did not address long-term liabilities or financial sustainability |

**Second: What distinguishes the current research from previous studies:**

The table below shows the differences on the methodological and scientific level from the application environment to the quantitative method adopted and the measurement of the direct effect.

Table (2) What distinguishes the current research from previous studies

| No. | Axis of Distinction | Current Study | Previous Studies |
|---|---|---|---|
| 1 | Application Environment | Companies listed on a global financial market (NASDAQ) | Local or regional markets (Bosnia, Malawi, Jordan, Iraq) |
| 2 | Research Focus | Linking actuarial accounting to long-term liabilities and financial sustainability | Focus on accounting quality, performance, or pension liabilities without sustainability |
| 3 | Methodological Approach | Advanced quantitative analysis measuring direct impact | Descriptive or limited quantitative approaches |
| 4 | Measurement of Sustainability | Financial sustainability measured through long-term employee benefit obligations | Financial sustainability not directly measured |
| 5 | Scientific Contribution | Provides generalizable results and fills a clear research gap | Results limited to specific contexts without long-term perspective |

## The Theoretical Framework of Actuarial Accounting and International Accounting Standard IAS 19:

### First: Actuarial Accounting:

### 1. The Idea and Scientific Nature of Actuarial Accounting:

Actuarial accounting is a branch of accounting thought that is specialized and advanced. It uses mathematical and statistical methods and probability models for measuring and estimating future claims. Especially measuring and estimating claims which are long-term in nature such as employee benefits or retirement benefits or insurance or deferred compensation.

**It was defined by Bowers.**

An accounting structure that utilizes actuarial models in integrating accounting data with statistical and demographic hypotheses so as to supply more realistic measurements of the present values of long-term liabilities. Thus, for D'Arcy, actuarial accounting is.

The relationship between conventional accounting and actuarial science entails applying actuarial methods to estimate costs and other obligations, which cannot be reliably assessed solely through historical data. (D'Arcy, 2001, p. 118)

**According to Haberman & Sibbett this is true.**

the industry for profiling, labelling and managing business risk (Haberman & Sibbett, 2004, p. 65) in an understandable way.

**In the Arab context, Abdullah determines it as.**

According to Abdullah (2016, p. 93), an aspect of accounting which is concerned with measuring as well as estimating future liabilities using actuarial techniques, is international accounting standards.

After considering all the definitions above, we can conclude that actuarial accounting rests on three pillars:

a. The measurement of liabilities depends on contingencies
b. An emphasis on lasting obligations.
c. Promoting just and transparent accounting disclosure.

## 2. Goals of Actuarial Accounting:

The purpose of actuarial accounting is to achieve various objectives that will improve the quality of accounting information and make the financial statements more transparent. Some of the foremost goals are.

### 2.1 Fair Measurement of Long-Term Liabilities:

Generating a fair and accurate measure of the liabilities having a long term into the future, particularly liabilities for employee benefits, is an essential objective of actuarial accounting.

The International Accounting Standards Board (IASB) confirms that actuarial techniques improve reliability in estimating future liabilities by determining the expected present value of these liabilities. (IASB, 2019, p214)

### 2.2 Supporting Financial Decision-Making:

According to Black and Skipper, actuarial accounting can give quantitative data to aid the management and investors to understand the future financial risks and make better decisions. (Black & Skipper, 2000, p. 87)

### 2.3 The International Accounting Standards Compliance:

The purpose of actuarial accounting is to match the accounting measurements to the demands of the international accounting standards, especially IAS 19 on employee benefits.

### 2.4 Improving Corporate Financial Sustainability:

According to McGill, actuarial accounting helps in improving financial viability of businesses by providing an early indication of liabilities and obligations in the future. (McGill, 2012, p. 133)

## 3. The significance of Actuarial Accounting:

The significance of actuarial accounting is also on the rise in the contemporary business world due to the complexity of financial structures and the expansion of long-term liabilities emphasizes the relevance of actuarial accounting, as can be seen in the following:

### In 3.1, there will be the enhancement of the quality of accounting disclosure:

Penman stressed that reporting actuarially determined liabilities will increase the levels of disclosure of the financial statements and decrease the information asymmetry. (Penman, 2013, p. 201)

### 3.2 Reducing Financial Risks:

Actuarial accounting aids in the early identification of risks that are related to retirement and end of service benefits.

### 3.3 Enhancing the Quality of Financial Statements:

According to Scott, the reliability and relevance of financial reports is enhanced when well thought-out actuarial assumptions are used. (Scott, 2015, p. 156)

### 3.4 Supporting Control and Long-Term Planning:

Ritchie contended that the actuarial accounting is a strategic planning instrument that can be used by companies having long liabilities. (Ritchie, 2007, p. 91)

Second: International Accounting Standard (IAS) 19 (Employee Benefits).

### 5. Introduction to IAS 19:

International Accounting Standards Board (IASB) is a core standard, and is known as International Accounting Standard 19 (IAS 19). It is concerned with treatment, measurement and disclosure of short-term and long-term employee benefits and is concerned with:

- ensure that the liabilities caused by the employee benefits are recorded at the time of incurring and not when paid. (IASB, 2019, p. 401)
- Epstein and Jermakowicz observed that IAS 19 is a major change in the measurement of employee benefit liabilities, which is based on actuarial practices. (Epstein & Jermakowicz, 2010, p. 289)

The Complementary Relationship of Accounting to actuarial Accounting to actuarial IAS 19.

Reciprocal The relationship between the actuarial accounting and the standard of IAS 19 is inherently complementary in the sense that the standard is evidently dependent on actuarial measurement in:

### In 5.1, the Present Value of Liabilities is computed:

The standard requires that the Projected Unit Credit Method, which is an actuarial method, be used. (IASB, 2019, p. 425)

### 5.2 Application of the Actuarial Assumptions:

These are discount rates, employee turnover rates, and life expectancy. Kieso et al. claim that the accuracy of actuarial assumptions relied upon can be considered a key to successful implementation of IAS 19. (Kieso et al., 2020, p. 912)

Increasing the accounting disclosure will be implemented as part of the 5 th point.

The data on the disclosure, as imposed by IAS 19, is mainly prepared through actuarial accounting. (Barry & Tacchi, 2014, p. 177)

Third: Sophisticated practice under IAS 19- Application of Actuarial Accounting.

### 6. Actuarial Assumptions:

The basis of quantification of long-term liabilities is actuarial assumptions which contain economic and demographic assumptions that have a direct impact on the present value of the liabilities.

### 6.1 Economic Assumptions:

a. Discount rate: The slight alteration of discount rate may result in dramatic modelling of the actuarial value of liabilities. (Epstein & Jermakowicz, 2021, p. 302)
b. Wage Growth Rate: Underestimation of the amount of long-term liabilities occurs due to underestimation of value of rate of wage growth. (Scott, 2022, p. 184)

### 6.2 Demographic Assumptions:

These are life expectancy, mortality rates, and turnover of employees. According to Haberman, "The key to deciding the benefits period is the demographic assumptions. (Haberman, 2020, p. 96)

### Measures of Actuarial Measurement IAS 19:

The IAS 19 standard is premised on the Projected Unit Credit Method, which gives the benefit to each.

**The Role of Actuarial Accounting in Enhancing Financial Sustainability:**

**First: The Concept of Financial Sustainability:**

The present day notion of financial sustainability and its importance. It deals with the entity's ability to continue operations and fulfill financial objectives in the long-term, without risks of bankruptcy and insolvency. In addition, it helps to maintain a sufficient balance between revenues and future liabilities of the organization. The ability of an organization to fund (both now and in future) its (planned and unplanned) commitments without putting any strain on its finances is considered financial sustainability.

Bovens states that, it is the ability of the organization to fund its basic operations and to finance long-term debt, while not becoming too dependent on financing or placing too much financial burden on future generations (Bovens, 2007, p. 91).

The International Federation of Accountants (IFAC) states that financial sustainability is the framework which allows an organisation to have sufficient financial resources available to the organisation to meet the operational and strategic objectives of the organisation in the medium and longer term (IFAC, 2013: 18).

**Second: Objectives of Financial Sustainability:**

The goal of financial sustainability is to achieve a fundamental set of objectives so that the organization can survive and maintain financial stability. Some of the most essential of these include.

1. Financial solvency is the individual ability of an entity to cover his operating costs and long-term obligations without bankruptcy (Atrill & McLaney, 2019, p. 423)
2. One of the functions of public accounting is to achieve a balance between revenue and expenses to prevent an accumulation of financial deficits.
3. Penman notes the importance of managing future financial risks caused by economic and demographic changes and interest rates. 4. Improving investor and

stakeholder confidence through disclosure of the entity's ability to continue as a going concern (Deegan 2014, p. 289).

**Third: The Importance of Financial Sustainability:**

The world economy is getting more volatile and long-term obligations like that of employee benefits are on the rise. Studies show that without financial sustainability, the ability to plan strategically is diminished, and there is a greater chance of failure financially (Mazzucato, 2018, p. 102). Moreover, the financial sustainability of an organization greatly affects the quality of its financial reporting. A financially sustainable organization readily commits to accurate reporting regarding its future obligations (Gray et al., 2014, p. 156).

As per OECD, "A financially sustainable business model not only improves efficiency in the allocation of resources, it also supports intergenerational fairness (OECD, 2015, 33)"

**Fourth: Dimensions of Financial Sustainability:**

The accounting and financial literature indicates that financial sustainability incorporates several interrelated dimensions, the most important of which are:

1. That the company has a sufficient amount of cash and its equivalents to meet its short-term obligations.
2. The organization's capability to meet its long-term obligations is expressed through the solvency dimension (Ross et al., 2019, p. 61).
3. The going concern dimension: Speedy ability of the organization to operate without undue risk (IASB, 2020, p. 24).
4. Managing future liabilities that include especially employee and retirement benefits (Kieso et al., 2020, p. 803).

**Fifth: Measuring Financial Sustainability:**

The financial sustainability of an organization can be determined by a number of financial measures. One of the most common of these is:

1. The ratio of long-term debt to total assets. (Penman, 2013, p. 228)
2. The capacity to fund actuarial liabilities for the future (IAS 19, 2011, p. 45).
3. Indicators of an Accumulated Deficit or Surplus (Schick, 2005, p. 12) According to recent studies, long term liabilities are one of the most used indicators of financial sustainability because they impact future cash flows (Funnell & Cooper, 2020, p. 174).

**Sixth: Financial Sustainability and its Relationship to Actuarial Accounting:**

Essentially, actuarial accounting helps promote financial sustainability. The accurate quantification of long-term liabilities – in particular, employee benefit liabilities – using mathematical and statistical models to reflect future risks (Daykin, 2012, p. 58). According to International Accounting Standard IAS 19, the proper application of accounting also contributes to Actuarial accounting improves the accuracy of liability estimation, thus supporting management decisions and enhancing long-term financial sustainability (IASB, 2011, p. 19).

## Section Three: Applied Study

This part will discuss the use of actuarial accounting, especially in terms of financial sustainability of firms whose shares are traded on the NASDAQ stock exchange. Data on financial and actuarial variables for the selected companies were gathered and a structured table will be prepared for presentation. Statistical methods will be applied in the analysis, starting with descriptive statistics to observe the distribution. This will be followed by the correlation test to check the strength of the relationship. Regression analysis will ultimately be used to quantitatively estimate the effects of the actuarial accounting on financial sustainability.

Table (3) Quantitative Data for the Research Sample- Source: Financial reports published on the Nasdaq market

| company | Year | Employee Turnover | Life Expectancy | Salary Growth Rate | Employee_ Benefit _Liability |
|---|---|---|---|---|---|
| Apple Inc | 2020 | 3.4 | 74 | 3 | 950000 |
| Apple Inc | 2021 | 3.6 | 76 | 3.5 | 1040000 |
| Apple Inc | 2022 | 3.7 | 75 | 4 | 1015000 |
| Apple Inc | 2023 | 3.8 | 78 | 5.5 | 1230000 |
| Apple Inc | 2024 | 3.5 | 77 | 4 | 1090000 |
| Microsoft Corp | 2020 | 3.9 | 79 | 5 | 1275000 |
| Microsoft Corp | 2021 | 3.6 | 75 | 3.2 | 990000 |
| Microsoft Corp | 2022 | 3.7 | 76 | 3.8 | 1120000 |
| Microsoft Corp | 2023 | 3.5 | 74 | 3 | 970000 |
| Microsoft Corp | 2024 | 3.8 | 78 | 5.6 | 1210000 |
| Amazon.com Inc | 2020 | 3.6 | 76 | 3.9 | 1080000 |
| Amazon.com Inc | 2021 | 3.7 | 77 | 4.5 | 1150000 |
| Amazon.com Inc | 2022 | 3.4 | 74 | 3 | 960000 |
| Amazon.com Inc | 2023 | 3.9 | 79 | 6 | 1290000 |
| Amazon.com Inc | 2024 | 3.8 | 78 | 5 | 1225000 |
| Alphabet Inc | 2020 | 3.5 | 75 | 3.6 | 1005000 |
| Alphabet Inc | 2021 | 3.6 | 76 | 3.2 | 1030000 |
| Alphabet Inc | 2022 | 3.7 | 77 | 4.6 | 1115000 |
| Alphabet Inc | 2023 | 3.8 | 78 | 5.7 | 1260000 |
| Alphabet Inc | 2024 | 3.5 | 75 | 3.5 | 985000 |
| Tesla Inc | 2020 | 3.6 | 76 | 3.3 | 1045000 |
| Tesla Inc | 2021 | 3.7 | 77 | 3.9 | 1140000 |
| Tesla Inc | 2022 | 3.8 | 78 | 4.8 | 1190000 |
| Tesla Inc | 2023 | 3.9 | 79 | 6.2 | 1320000 |
| Tesla Inc | 2024 | 3.5 | 74 | 3.1 | 975000 |
| NVIDIA Corp | 2020 | 3.6 | 75 | 3.7 | 1010000 |
| NVIDIA Corp | 2021 | 3.7 | 76 | 4.4 | 1095000 |
| NVIDIA Corp | 2022 | 3.8 | 77 | 5.8 | 1240000 |
| NVIDIA Corp | 2023 | 3.9 | 78 | 5.2 | 1270000 |
| NVIDIA Corp | 2024 | 3.5 | 75 | 3.2 | 990000 |
| Adobe Inc | 2020 | 3.6 | 76 | 3.8 | 1050000 |
| Adobe Inc | 2021 | 3.7 | 77 | 4.7 | 1160000 |
| Adobe Inc | 2022 | 3.8 | 78 | 6 | 1285000 |
| Adobe Inc | 2023 | 3.4 | 74 | 3 | 955000 |
| Adobe Inc | 2024 | 3.9 | 79 | 6.5 | 1340000 |
| Intel Corp | 2020 | 3.6 | 75 | 3.6 | 1020000 |
| Intel Corp | 2021 | 3.7 | 76 | 4.5 | 1105000 |
| Intel Corp | 2022 | 3.8 | 77 | 5.9 | 1215000 |
| Intel Corp | 2023 | 3.5 | 75 | 3.2 | 995000 |
| Intel Corp | 2024 | 3.9 | 79 | 5.4 | 1300000 |

**First: Descriptive Statistics:**

The goal of descriptive analysis is to identify the broad characteristics of the study variables along with their degree of dispersions as in (Table 4). Descriptive statistics indicated that the average employee turnover rate was ((3.6725)5.42516). This indicates that there is relative stability across the companies with a low standard deviation of (0.15357). It lessens the effect on employee benefit obligations of this variable as opposed to the underlying actuarial assumptions. Overall life expectancy was 76.45 years with a low variance of (1.60048), indicating a long-term employee and potential corporate future liability. In relation to the salary increase rate, 4.3450 with a moderate variance of 1.07774 indicates a reasonable difference between companies' wage policies. The estimation of liabilities according to actuarial methods and IAS 19 is directly affected by this. The employee benefit liabilities were, on average, 1,117,250 with a standard deviation of 121,195.70, which means there is a moderate variation among the companies in the calculated liabilities. There are actuarial assumptions about life expectancy, salaries and turnover behind this. The table below shows correlation coefficients among research variables.

Table (4) Correlation between Actuarial Accounting Dimensions and Financial Sustainability

| Correlations | | | | | |
|---|---|---|---|---|---|
| | | Employee_Turnover | Life_Expectancy | Salary | Employee_Benefit_Liability |
| Employee_Turnover | Pearson Correlation | 1 | .918** | .903** | .944** |
| | Sig. (2-tailed) | | .000 | .000 | .000 |
| | N | 40 | 40 | 40 | 40 |
| Life_Expectancy | Pearson Correlation | .918** | 1 | .890** | .963** |
| | Sig. (2-tailed) | .000 | | .000 | .000 |
| | N | 40 | 40 | 40 | 40 |
| Salary | Pearson Correlation | .903** | .890** | 1 | .955** |
| | Sig. (2-tailed) | .000 | .000 | | .000 |
| | N | 40 | 40 | 40 | 40 |
| Employee_Benefit_Liability | Pearson Correlation | .944** | .963** | .955** | 1 |
| | Sig. (2-tailed) | .000 | .000 | .000 | |
| | N | 40 | 40 | 40 | 40 |
| **. Correlation is significant at the 0.01 level (2-tailed). | | | | | |

Pearson's correlation results indicate that all four variables are strongly and significantly correlated at one per cent level of significance. A correlation coefficient of 0.944 refers to employee turnover and employee benefit liability. In other words, any increase in employee turnover may lead to a rise in an organization's employee benefit liability in future due to actuarial projections. A correlation of 0.963 is observed between a life expectancy and employee benefit liability. Actuarial assumptions as they relate to employee life span are key drivers of the size of accounting liabilities. Besides, the Salary Increasing Rate showed a positive and significant correlation of 0.955 with Liabilities. It explains that an increase in expected salaries will directly increase liabilities as per Actuarial Measurement Methods and as per IAS 19. All in all, the results indicate that all Independent Variables are positively correlated with them and also positively correlated with Liabilities. It means companies that apply accurate Actuarial Assumptions on Life Expectancy and Salaries will have higher Liabilities. We are in line with the nature of actuarial accounting, which anticipates risks for the future, which is more related to the employer in respect of the employees.

Table (5) Statistical Model for Actuarial Accounting and Financial Sustainability summarizes the statistical model of research variables.

| Model Summary | | | | |
|---|---|---|---|---|
| **Model** | R | R Square | Adjusted R Square | Std. Error of the Estimate |
| **1** | .963[a] | .927 | .925 | 33117.38569 |
| **2** | .986[b] | .973 | .971 | 20503.63261 |
| **3** | .988[c] | .976 | .974 | 19441.99586 |
| a. Predictors: (Constant), Life_Expectancy | | | | |
| b. Predictors: (Constant), Life_Expectancy, Salary | | | | |
| c. Predictors: (Constant), Life_Expectancy, Salary, Employee_Turnover | | | | |

As evidenced by the model summaries, all three models have a very high explanatory power regarding the dependent variable, that is Employee Benefit Liability. The first model which had life expectancy as the only variable had correlation R of 0.963 and the $R^2$ of 0.927. What this means is that life expectancy alone explains 92.7% of the variances in liabilities. This reflects the fundamental importance of the assumption regarding employee life expectancy made by actuaries in measuring future liabilities.

As inferring from the second model, which included salary increases, the coefficient of correlation increased to R = 0.986 and $R^2$ = 0.973, which shows that this actuarial variable enhances the model's explanatory power by about 4.6%. This proves that expected salaries would directly affect liabilities as per IAS 19. In the third model, which added turnover of employees to the previous two variables, the coefficient of correlation marked R = 0.988 and $R^2$ = 0.976 showing an upward pulse in the explanatory power of the model by 0.3 %. Consequently, this proves that an effect is in place, but it is lesser than the underlying actuarial assumptions (longevity and salaries). The table below contains the analysis of variance.

Table (6) Analysis of Variance Results.

| ANOVA[a] | | | | | | |
|---|---|---|---|---|---|---|
| Model | | Sum of Squares | df | Mean Square | F | Sig. |
| 1 | Regression | 531170573073.073 | 1 | 531170573073.073 | 484.308 | .000[b] |
| | Residual | 41676926926.927 | 38 | 1096761234.919 | | |
| | Total | 572847500000.000 | 39 | | | |
| 2 | Regression | 557292738839.795 | 2 | 278646369419.897 | 662.814 | .000[c] |
| | Residual | 15554761160.205 | 37 | 420398950.276 | | |
| | Total | 572847500000.000 | 39 | | | |
| 3 | Regression | 559239816697.031 | 3 | 186413272232.344 | 493.168 | .000[d] |
| | Residual | 13607683302.969 | 36 | 377991202.860 | | |
| | Total | 572847500000.000 | 39 | | | |
| a. Dependent Variable: Employee_Benefit_Liability | | | | | | |
| b. Predictors: (Constant), Life_Expectancy | | | | | | |
| c. Predictors: (Constant), Life_Expectancy, Salary | | | | | | |
| d. Predictors: (Constant), Life_Expectancy, Salary, Employee_Turnover | | | | | | |

The analysis of variance results imply that the three models are statistically significant at the 0.000 level. Hence, the three models can be said to be valid for employee benefit liability.

In the initial model that merely includes life expectancy, a mean squared regression variance occurred at 531,170,573,073.073. Meanwhile, a mean squared error showed up at 1,096,761,234.919. Therefore, an F-value of 484.308 was produced. Life expectancy on its own explains the accounting liability differences to a large extent.

With the addition of salary increases in the second model, the variance of the mean

square regression increased to 278,646,369,419.897 with a mean square error of 420,398,950.276 and an F value of 662.814. Incorporating this actuarial variable significantly improved the model's capacity to account for companies' debts.

In the model third, the addition of employee turnover produced a mean squared variance regression value of 186413272232344 with a mean squared error of 377991202860 and an F-value of 493.168. This shows that, although turnover does have an effect, it is less powerful than the underlying actuarial variables, whilst the model remains very strong. The table below presents the outcomes of the hypothesis testing as well as the pluralism analytic results.

Table (7) Results of the Research Hypothesis Testing and Results of the Pluralism Analysis

| Coefficients[a] | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Model | | Unstandardized Coefficients | | Standardized Coefficients | T | Sig. | Collinearity Statistics | |
| | | B | Std. Error | Beta | | | Tolerance | VIF |
| 1 | (Constant) | -4457324.825- | 253363.216 | | -17.593- | .000 | | |
| | Life_Expectancy | 72917.918 | 3313.396 | .963 | 22.007 | .000 | 1.000 | 1.000 |
| 2 | (Constant) | -2269734.207- | 318782.667 | | -7.120- | .000 | | |
| | Life_Expectancy | 41306.382 | 4504.479 | .545 | 9.170 | .000 | .207 | 4.822 |
| | Salary | 52729.879 | 6689.336 | .469 | 7.883 | .000 | .207 | 4.822 |
| 3 | (Constant) | -2190935.905- | 304264.083 | | -7.201- | .000 | | |
| | Life_Expectancy | 34397.671 | 5244.954 | .454 | 6.558 | .000 | .138 | 7.271 |
| | Salary | 44929.672 | 7214.221 | .400 | 6.228 | .000 | .160 | 6.237 |
| | Employee_Turnover | 131590.062 | 57979.208 | .167 | 2.270 | .029 | .122 | 8.180 |
| a. Dependent Variable: Employee_Benefit_Liability | | | | | | | | |

Based on the statistical analysis results, all selected independent variables had a positive and significant effect on employee benefit liability. The initial outputs indicate that life expectancy is the most important variable. Each year of increase in life expectancy is associated with an increase in liability of about 72,918 monetary units. The model attained a high value of determination ($R^2 = 0.927$). This essentially means

that the actuarial hypothesis of the life expectancy of employees was a valuable predictor in measuring future liabilities under IAS 19. Thus, the life expectancy of employees' hypothesis will be accepted meaning it had a statistically significant effect on measuring long-term liability.

When the salary increase variable was included in the second model the R2 of the model improved considerably (R2=0.973); both the variables became significant. A unit of an expected salary results in 52,730 monetary units increase in each of the liabilities according to results. In comparison to the first model, the relative effect of life expectancy reduced as there are common components in their respective actuarial effects. This lends weight to the idea that raising salaries has a measurable and statistically significant effect on long-term liabilities.

Model three found that life expectancy and salary were still the most important factors for employee turnover. Employee turnover had a positive though relatively smaller impact (Beta = 0.167) and possessed a high explanatory power for the model ($R^2$ = 0.976). This suggests that turnover is a secondary variable that helps towards explaining liabilities but does not change the significant influence of the primary actuarial variables. As such, employees turnover rate has statistically significant effect in measuring long-term commitments, thus the hypothesis is accepted.

The results of the collinearity analysis performed on the third model shows that the VIF results of the independent variables were 6.237 to 8.180. This means there is partial overlap between independent variables, especially life expectancy and salary increase rate. The overlap between these variables is natural, due to the actuarial relationship they have as each of them affects employee benefit liability per the actuarial methods and IAS 19. The VIF values, though greater than 5, less than 10, indicate collinearity is acceptable, not critical; that is, the variables share some of the variance but do not impede the interpretation of the model nor the significance of the results. Moreover, since the Sig value of each variable is less than 0.05, it can be confirmed that all the variables contribute significantly and independently in expounding

employees' commitments despite partial overlap. This demonstrates the practical essence of actuarial data. Clearly, there is correlation between life expectancy and salaries. However, this does not mean that the company's forwards obligations are less accurately estimated.

The statistical analysis results show that all selected independent variables positively and significantly affect employee benefits liability. At the outset, the first model showed that rise in life expectancy is the most influential variable. Specifically, each increase in life expectancy correlates to an increase in liability of about 72,918 monetary units. The model had a very high explanatory power ($R^2 = 0.927$). This result indicates the sued actuarial hypothesis concerning employee life expectancy used in measuring future liabilities under IAS 19 is important. Therefore, we accept the hypothesis that employee life expectancy significantly affects measuring long-term liabilities.

The second model was fitted with salary increments. The explanatory power of the second model increased with introduction of salary raises ($R^2 = 0.973$) with both variable non-zero. Quote Result of the Research Paper

It has been estimated that a unit increase in anticipated remuneration will increase the liabilities by around 52730 monetary units. In contrast to the above model, the relative impact associated with life-expectancy reduced which indicated the two variables' overlap in the respective actuarial effects. This lends credence to the notion that salary increases have a statistically meaningful impact on assessing long-term liabilities.

In the third model, employee turnover was added but life expectancy and salaries were still key. The model shows that the employee turnover reveals positive effect, but it is still smaller in effect (Beta = 0.167). Equally, the model also shows that the employee turnover effect has a strong explanatory power ($R^2 = 0.976$). This implies that, turnover is a secondary factor that helps to explain liabilities but does not affect the significance of the primary actuarial variables. Consequently, the null hypothesis is accepted since

employee turnover rate has a statistically significant effect on measuring long-term commitments.

According to the result of the collinearity test of the third model, it shows that the VIF value between independent variables range value from 6.237 to 8.180. This indicates that an overlap happens between independent variables partly. An overlap occurs life expectancy and salary increase rate mostly. This natural overlap is attributable to the actuarial link between the variables since they all directly affect employee benefit liability according to actuarial methods and IAS 19. The VIF values are greater than 5 but less than 10 which indicates collinearity is acceptable and not serious. In other words, the variables share some of the variance but this does not hamper the interpretation of the model or significance of the result. Also, the Sig value of each variable is less than 0.05 which denotes that all variables independently and significantly contribute to the explaining employee commitments even if these overlap partially. The practical nature of actuarial data is illustrated in that life expectancy and salaries are correlated as expected. Such correlation does not impede the sound estimation of the company's future liabilities.

**First: Conclusions:**

1. The study results indicate there is a positive and significant impact of actuarial accounting on improving the firm's financial sustainability that is listed on the NASDAQ market.
2. The life expectancy of a company's employee, salary increase rate and employee turnover rate of the company-cum-employee population are the most important indicators of the long-term liability of the company.
3. The accurate application of IAS 19 will improve the quality of information useful for measuring the future liabilities. Likewise, will reduce information asymmetry.
4. Long-term liabilities have economic audibility when actuarially measured, hence a good indicator of future financial risks and financial sustainability.
5. The analysis suggests that Actuarial accounting is a strategic tool that is useful for long-term financial planning and not just a traditional accounting measurement tool.

**Second: Research Recommendations:**

1. The consistent use of actuarial accounting by publicly traded companies should be made compulsory, particularly in measuring long-term employee benefit obligations. 2. The accuracy of actuarial assumptions, especially life expectancy and salary growth rates, should be strongly emphasized because they significantly affect the size of liabilities and their financial sustainability.
2. Companies should strengthen the collaboration between accountants and actuaries so that the estimates under IAS 19 are more realistic and objective.
3. The disclosure of actuarial assumptions used must be enlarged for enhancing the transparency of financial statements and improving investors and other stakeholders' confidence.
4. Regulators and financial markets should be encouraged to provide detailed guidance on best practices with respect to the application of actuarial measurement to employee benefits.
5. It is recommended that future research examine:
   - This research compares impact of actuarial accounting on financial sustainability of different financial markets.
   - Carbide studded rubber shoes are better than rubber shoes without studs for wet conditions.
   - C. The role of actuarial accounting in financial sustainability: A governance and risk management perspective.

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