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**An ESG-aligned Education Insurance Model Funded by Safaricom's Bonga Points.**

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## Table of contents

|                                                               |    |
|---------------------------------------------------------------|----|
| List of Abbreviations.....                                    | iv |
| Abstract.....                                                 | v  |
| CHAPTER ONE: INTRODUCTION.....                                | 1  |
| 1.1 Background information. ....                              | 1  |
| 1.1.1 Education Costs and Insurance .....                     | 2  |
| 1.2 Problem Statement.....                                    | 3  |
| 1.3 Research questions.....                                   | 4  |
| 1.4 Research objectives.....                                  | 4  |
| 1.5 Significance of the research.....                         | 5  |
| CHAPTER TWO: LITERATURE REVIEW.....                           | 6  |
| 2.1 Theoretical Framework.....                                | 6  |
| 2.2 Empirical Literature Review.....                          | 7  |
| 2.2.1 Mobile Money.....                                       | 7  |
| 2.2.2 M-PESA and Loyalty Points in Kenya .....                | 7  |
| 2.2.3 Education Insurance and Mobile Technology.....          | 9  |
| 2.2.4 ESG Compliance for an Education Insurance Product ..... | 10 |
| 2.3 Research Gap .....                                        | 11 |
| CHAPTER THREE: METHODOLOGY .....                              | 13 |
| CHAPTER 4: RESULTS AND ESTIMATIONS.....                       | 17 |
| 4.1 Introduction.....                                         | 17 |
| 4.2 Inflation rates .....                                     | 17 |
| 4.2.1 Vasicek model forecasting of inflation rates. ....      | 18 |
| 4.3 Education Costs .....                                     | 20 |
| 4.4 Bonga Points .....                                        | 20 |
| 4.5 Conversion Rate and Feasibility .....                     | 21 |
| 4.5.1 Forecasted Values.....                                  | 22 |
| CHAPTER 5: CONCLUSION, LIMITATIONS, AND RECOMMENDATIONS ..... | 24 |
| 5.1 Conclusion .....                                          | 24 |
| 5.2 Limitations of the Study.....                             | 24 |
| 5.3 Recommendations.....                                      | 25 |
| References.....                                               | 26 |

## List of Abbreviations

**Bonga Points** - Safaricom's loyalty program

**C2B** - Customer-to-Business

**ESG**- Environmental Social Governance

**KES** - Kenyan Shillings

**MNO** - Mobile Network Operator

**MShwari** - A mobile banking service by Safaricom

**NFC** - Near-Field Communication

**P2P** - Person-to-Person

**SMS** - Short Message Service

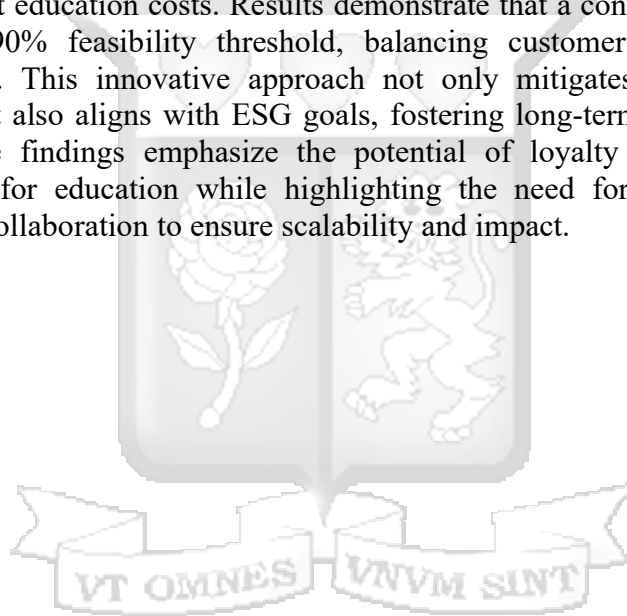
**UHC** - Universal Health Coverage

**CBK** - Central Bank of Kenya



## Abstract

This study explores an ESG-aligned education insurance model utilizing Safaricom's Bonga Points to address indirect education costs in Kenya, such as transportation, uniforms, and school supplies. By leveraging digital loyalty points, the proposed model integrates principles of environmental sustainability, social equity, and ethical governance to enhance financial inclusion. The research employs the Vasicek model to project inflation-adjusted education costs and evaluates the model's feasibility across varying conversion rates of Bonga Points. Microsoft Excel was instrumental in modelling the Vasicek framework by enabling the calculation of key parameters such as mean reversion speed, long-term mean, and volatility through regression techniques. It also facilitated forecasting inflation rates using stochastic simulations and graphical comparisons to assess the feasibility of accumulated Bonga Points against education costs. Results demonstrate that a conversion rate of 1:1.467 achieves a 90% feasibility threshold, balancing customer value with business sustainability. This innovative approach not only mitigates financial barriers to education but also aligns with ESG goals, fostering long-term social and economic benefits. The findings emphasize the potential of loyalty programs as funding mechanisms for education while highlighting the need for further research and stakeholder collaboration to ensure scalability and impact.



## CHAPTER ONE: INTRODUCTION.

### 1.1 Background information.

In recent years, the insurance landscape has undergone many profound transformations, venturing into innovative territories that redefine its traditional roles in society. From fully digitizing customer interactions to catering to various niche markets such as environmental initiatives, modelling gender-specific products and even developing products for golf enthusiasts etc. Riding this innovation wave, the industry has embraced a spectrum of products that revolve around a central theme: an emerging campaign of ESG compliance.

ESG products, while integral for sustainable growth, pose unique challenges in developing economies like East Africa. However, drawing insights and experiences from similar initiatives in advanced economies, there lies an opportunity to tailor ESG products that resonate with our African demographic. Addressing needs, one may have never thought they had.

An example of ESG-aligned innovation in Kenya is found in the domain of health insurance, where initiatives like "Linda Jamii" and the new UHC Act have gained attention. Linda Jamii, a microinsurance medical product tailored for Kenya's uninsured population, aims to alleviate the healthcare burden, particularly for those in the informal sector. (*Changamka Profile.Pdf*, n.d.)

Beyond healthcare, ESG-compliance in insurance products also extends to education-related covers. These focus on the Social Impact aspect of ESG. Education is a powerful tool for social upliftment and economic empowerment. By offering educational products tailored for all individuals, insurers can promote social inclusion and reduce inequality. These products can provide access to quality education, skill development, and vocational training, enabling individuals to break the cycle of poverty and improve their livelihoods.

One standout player in the education insurance landscape of Kenya is "Jaza Pay." As a leading provider, Jaza Pay exemplifies the potential of insurance to bridge gaps in access and deliver tangible benefits to communities across the region. They not only offer families easy ways to save for their children's education and protect them from different risks but also give back to communities by supporting education and local

development projects (Colby Fayock - *A UX Designer & Front-End Developer Blog*, n.d.). Comparable products usually encompass several benefits, ranging from supporting children's education goals to providing financial security in the face of unforeseen circumstances. Despite their appeal, notable gaps exist ranging from accessibility to convenience to users.

Addressing this gap presents a dual challenge: enhancing accessibility may come at a cost of decreasing value. This research acknowledges this and endeavours to tackle these fundamental queries by exploring avenues that can make such ESG-compliant products more convenient, inclusive, and accessible while identifying additional benefits they can offer to diverse demographics. This research proposes a bold approach to the use of Safaricom's Bonga points as a funding source for our insurance model.

From all that has been discussed above, it is evident that as the insurance industry continues to evolve, embracing ESG principles in insurance holds the key to unlocking greater social impact and financial resilience in East Africa.

### **1.1.1 Education Costs and Insurance**

In an article (*How to Estimate Your Educational Costs (Article)*, n.d.) education-related expenditures were divided into direct costs and indirect costs. Direct costs consist of costs incurred for the implementation of teaching and student learning activities such as purchasing learning tools, providing learning facilities, and teacher salaries, whether they are issued by the government, parents, and students themselves. Meanwhile, indirect costs are in the form of lost profits in the form of lost opportunity costs sacrificed by students during learning, including transportation costs, uniform and meals costs, student pocket money, purchasing school equipment (pens, bags, notebooks, textbooks etc.)

In Kenya, the education insurance sector has seen notable growth, providing vital support for families looking to secure their children's educational futures amidst economic uncertainties. These insurance products help parents save for education costs both direct and indirect while offering financial protection against unexpected events

like disability, critical illness, or death of the primary breadwinner, ensuring that educational goals are met regardless of life's unexpected challenges.

Apart from "Jaza Pay" as previously mentioned, other prominent education insurance products in the Kenyan market include Britam's "Elimu Education Plan" and Jubilee Insurance's "Career Life Plus." These plans combine savings for education with life insurance coverage, creating a comprehensive safety net for families. The "Elimu Education Plan" by Britam, for example, not only provides a disciplined savings avenue but also guarantees payout even in the absence of the policyholder, thus securing the child's education. (*Britam-Education-Brochure.Pdf*, n.d.)

## 1.2 Problem Statement

The insurance industry is increasingly focusing on Environmental Social Governance compliance, leading to the development of innovative products designed to address specific societal needs. These ESG-compliant products have the potential to transform various economic sectors. In the context of this research, education-related insurance products play a pivotal role in promoting access to quality education, skill development, and vocational training, which are crucial for social inclusion and economic empowerment.

Despite the promising benefits of products like "Jaza Pay," which provides insurance solutions for education, there are noticeable gaps in inclusion, accessibility, and convenience. These shortcomings hinder the overall effectiveness and reach of these products, limiting their social impact.

The core challenge lies in developing education insurance products that are not only ESG-compliant but also accessible, convenient, and inclusive for the Kenyan population. An innovative solution to these issues could be the use of Safaricom's Bonga points as a funding mechanism. This approach presents a dual challenge: increasing accessibility and convenience while maintaining or enhancing the value of the insurance products. There is currently a notable research gap regarding the integration of ESG principles into education insurance in developing economies like Kenya, particularly concerning the use of digital loyalty points as a funding source.



This research aims to fill this gap by exploring the feasibility and effectiveness of using Safaricom Bonga points to fund indirect costs related to education tailored into a comprehensive insurance product for the Kenyan population. It is important to note that previous attempts to use a similar model for larger expenses, like funding a pension scheme, proved non-feasible. Consequently, the direct education costs, such as tuition, were deemed impractical to cover. Therefore, this research will focus on developing a model that targets smaller expenses, specifically indirect education costs. The study seeks to develop a model that aligns with ESG principles, promoting environmental sustainability, social equity, and ethical governance. By doing so, the research will aim to enhance specifically the accessibility and convenience of these insurance products, contributing to the social impact and financial resilience of the Kenyan educational sector.

### **1.3 Research questions**

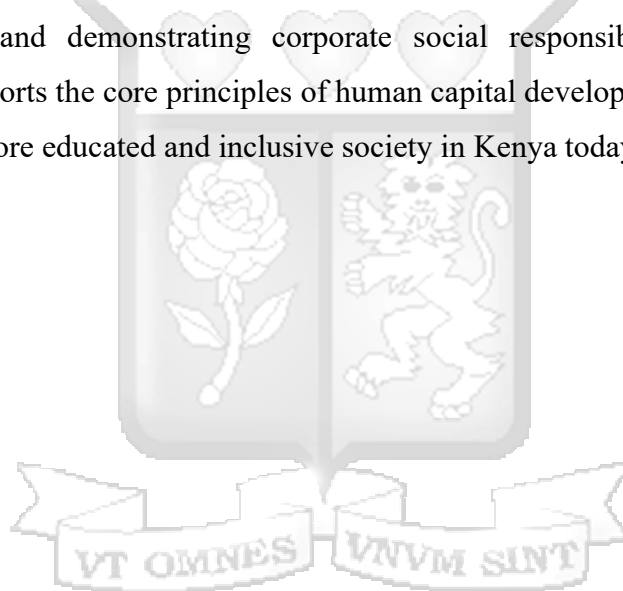
- i. How feasible and effective is the use of Bonga points in funding indirect education costs in Kenya?
- ii. What is the potential for scaling and ensuring the long-term sustainability of this model?

### **1.4 Research objectives**

- i. To develop a model that utilizes Safaricom Bonga Points to fund indirect education costs.
- ii. To evaluate the amount of Bonga Points needed to effectively cover indirect education expenses and to determine spending patterns related to these costs.
- iii. To align with and promote ESG Principles through innovative funding with Bonga points.

### 1.5 Significance of the research

This research has the potential to redefine the bounds of education insurance in Kenya. By focusing on indirect education costs, this model aims to enhance accessibility and convenience from the very passive funding mechanism involved that would impact no extra cost the policyholder would not have already been incurring. The benefits are far-reaching- students and families will experience financial relief by alleviating the financial burden associated with extra costs, such as transportation, uniforms, and school supplies, while educational institutions could see increased consistent enrolment and financial stability of patrons. Insurance companies will also be able to expand their market with the uninsured population while also enhancing their brand reputation. Finally, this would also benefit Safaricom by boosting customer engagement and demonstrating corporate social responsibility. Ultimately, this research supports the core principles of human capital development and social equity, fostering a more educated and inclusive society in Kenya today.



## **CHAPTER TWO: LITERATURE REVIEW**

### **2.1 Theoretical Framework**

The development of this model is surrounding several contemporary theories. Understanding these theories is essential for crafting an insurance model that is innovative, practical, and sustainable.

#### **2.1.1 Inclusive Finance Theory**

(Richard, n.d.) highlighted the importance of providing financial services to underserved populations. The central idea is that financial inclusion can drive economic development and reduce poverty. The theory suggests that accessible and affordable financial services are crucial for inclusive growth. This perspective aligns perfectly with the use of mobile transactions for funding education indirect costs, guiding the study in adopting a model that enhances financial inclusion through mobile technology.

#### **2.1.2 Human Capital Theory**

Human Capital Theory, developed by (Schultz, 1961), explains the economic value of investing in education and training. It rests on the assumption that investments in human capital tend to lead to higher productivity and economic growth. The theory's main thesis is that education is a key driver of economic development. This theory supports the study by emphasizing the long-term economic benefits of education, highlighting the importance of investing in education to improve socio-economic outcomes.

#### **2.1.3 Social Capital Theory**

Social capital is the positive outcome of human interaction that can be tangible or intangible. (Putnam, 2000) introduced the Social Capital Theory to expound the value of social networks, norms, and trust in facilitating cooperation and coordination. The fundamental assumption is that social capital enhances collective action for mutual benefit. The theory goes on to argue that strong social capital leads to better social and economic outcomes. This theory informs the study by illustrating how existing social trust in mobile transactions such as M-PESA can support the proposed education costs

funding model, by making it more marketable as well as competitive versus similar pre-existing norm education insurance models and products.

## **2.2 Empirical Literature Review**

### **2.2.1 Mobile Money**

In the 21st century, mobile technology and financial inclusion have emerged as pivotal concepts, particularly garnering substantial research attention over the past two decades. Mobile transactions being at the forefront of this research have, time and time again given rise to inquisitive and disruptive innovations such as savings plans and even insurance products. (Jussila, n.d.) categorizes mobile money services based on distance, service provider, and technology. In terms of distance, services are either contact-based or independent of location. Service providers vary from Mobile Network Operators (MNOs) to commercial banks, credit companies, and small application providers. Technologically, the services range from Near-Field Communication (NFC) to mobile networks and internet-based cryptography, such as Bitcoin.

(Jenkins, n.d.) asserts that the potential applications for mobile money are limitless, having profound implications for economic activities globally. Mobile money reduces both the costs and risks associated with handling cash. More importantly, it leverages an existing communications infrastructure that connects billions of individuals worldwide, surpassing the reach of traditional bank accounts. This facilitates seamless financial transactions between parties on an unprecedented scale.

### **2.2.2 M-PESA and Loyalty Points in Kenya**

M-PESA, a mobile money platform operated by Safaricom, leverages licensed SIM-based technology from Vodafone to facilitate user payments. Recognized as the world's most successful mobile money platform in terms of user base and transaction value within a single country, M-PESA stands out in Kenya (*What-Makes-a-Successful-Mobile-Money-Implementation.Pdf*, n.d.). This platform operates through SIM cards, making it compatible with a wide range of mobile phones, from high-end smartphones to basic devices.

M-PESA offers diverse services including Person-to-Person (P2P) money transfers, Customer-to-Business (C2B) payments for goods and services (e.g., Lipa na M-PESA), prepaid airtime purchases, micro-banking (e.g., MShwari), and utility bill payments. Users can deposit or withdraw money from their M-PESA accounts via an extensive agent network. While the most common uses are airtime top-ups and saving money, studies have shown that many users tend to transfer and withdraw deposited funds immediately rather than save them in their M-PESA accounts (Mbiti & Weil, 2011). However, user habits, including saving patterns, are evolving rapidly among both early and late adopters of the service (Jack & Suri, 2011).

This pioneering study by (Jack & Suri, 2011) investigated the impact of mobile money (M-PESA) in Kenya, revealing significant enhancements in financial inclusion, particularly among rural populations. This foundational research highlighted the transformative potential of mobile banking, emphasizing general financial inclusion. While not specifically addressing educational outcomes, their findings underscore the feasibility of mobile platforms in reaching vast communities, thus providing critical support for the current study.

(Suri & Jack, 2016) revisited the impact of M-Pesa on the Kenyan economy, emphasizing the broad developmental benefits of digital financial services. Its comprehensive analysis of the benefits of these services supports the integration of mobile transaction points into educational funding by demonstrating the sustainable long-term economic impacts of mobile money.

In the realm of financial inclusion and innovative models, leveraging loyalty programs such as Safaricom's "Bonga Points" offers a unique approach. Introduced in January 2007, the Bonga Points program allows both Prepay and Post-pay subscribers to earn one point for every Shs.10 spent on services such as voice calls, SMS, data, and M-PESA. These points can be redeemed for airtime, SMS, or merchandise, and even used at appointed retail outlets under the "Bonga everywhere" scheme (*Safaricom Annual Report 2023.Pdf*, n.d.). In the context of this insurance model for funding education costs, this program's structure offers a viable mechanism for accumulating savings through everyday expenditures. This approach also benefits from Safaricom's established revenue recognition practices, which defer revenue for accumulated points and recognize it upon redemption. This method ensures a

systematic and predictable accumulation of funds, addressing the financial security needs when it comes to catering to a child's indirect education expenses effectively.

Almost striking close to home, a recent study by (Kariuki, 2021) on a pension model offered a novel approach by leveraging Safaricom's Bonga Points loyalty program. This model operates on the assumption that pre-retirement mobile phone airtime expenditures can be effectively converted into Bonga Points, which then can be accumulated over time to form a pension fund. This aligns with broader efforts to improve social protection and financial inclusion in Kenya, demonstrating how loyalty programs can be repurposed to meet social welfare goals. The relevance of the study extends to any research focused on financial inclusion strategies. It highlights the potential for loyalty programs to be re-engineered for social benefits, providing a practical solution for savings fund accumulation that is both innovative and rooted in existing consumer habits. This informs the current study by reassuring the ability of loyalty points to finance indirect costs associated with education.

### **2.2.3 Education Insurance and Mobile Technology**

(Aker et al., 2016) went on to investigate the impact of mobile money on educational investments in rural Africa. The study found correlations between mobile money access higher school enrolment and reduced dropout rates. This study highlighted the positive effects of mobile money on education but did not delve into specific funding mechanisms using innovative structures such as loyalty points. Its relevance to educational outcomes supports the idea of using mobile transaction points to ease education indirect cost funding.

Habyarimana and Jack (2016) as cited in (Ghani et al., n.d.) conducted a field experiment in Kenyan schools focusing on M-Shwari, a digital bank account. They implemented two types of savings programs during the primary to secondary school transition: one with locked savings (commitment) and another with regular savings, both supplemented with text message reminders to save for education. The study revealed that both groups experienced higher savings rates and increased enrolment in secondary school compared to the control group. However, the differences in outcomes between the two savings programs were not statistically significant.

#### **2.2.4 ESG Compliance for an Education Insurance Product**

The integration of ESG principles into the development of this education insurance product is essential for ensuring that it remains sustainable, socially responsible, and ethically governed.

##### **Environmental Compliance**

Digital platforms have been instrumental in reducing the environmental impact associated with traditional paper-based financial transactions. Implementing digital platforms for policy issuance, claims processing, and customer communications significantly reduces paper usage and promotes sustainability. This approach is particularly relevant in the context of Safaricom Bonga points, where transactions can be conducted electronically, minimizing environmental footprints.

Investing premiums in environmental projects is a tangible way to demonstrate commitment to sustainability. This practice not only supports global sustainability efforts but also resonates with the values of environmentally conscious consumers.

##### **Social Compliance**

Ensuring accessibility to financial products is paramount for promoting social equity. (Richard, n.d.) highlight the importance of designing financial products that are inclusive of marginalized and underserved communities. This principle is vital for the education insurance product using Bonga points, as it aims to reach a broad demographic, including those in remote areas with limited access to traditional banking services.

Offering services in local languages and ensuring accessibility for people with disabilities are critical components of social compliance. Providing financial services that cater to the needs of diverse populations can significantly enhance inclusivity. For the Bonga points-based insurance product, this means ensuring that all communications and platforms are user-friendly and accessible to everyone.

Engaging with local communities during the design and implementation process ensures that the financial product meets their educational needs effectively. By

involving the community in the planning stages, the education insurance product can better address the unique challenges and needs of the communities it serves.

Maintaining transparent communication with beneficiaries about fund usage and the model's impact is essential for building trust. Regular updates and reports on how the Bonga points are being used can help build confidence among beneficiaries and stakeholders.

### **Governance Compliance**

Establishing a strong ethical framework and implementing anti-corruption measures are foundational to good governance in financial products. For the Bonga points-based education insurance product, this means implementing strict anti-corruption policies and conducting regular audits to ensure compliance.

Including representatives from various stakeholder groups in the governance structure ensures diverse perspectives in decision-making. By involving educators, community leaders, and policyholders in the governance process, the education insurance product can benefit from a wide range of insights and experiences.

Ensuring compliance with local and international regulations related to financial services, data protection, and education is necessary for legal adherence. The education insurance product must comply with all relevant regulations to ensure its operations are legal and ethical.

Protecting user data with robust cybersecurity measures and complying with data protection laws are fundamental for privacy and security. The education insurance product must implement strong cybersecurity protocols to protect the sensitive information of its users.

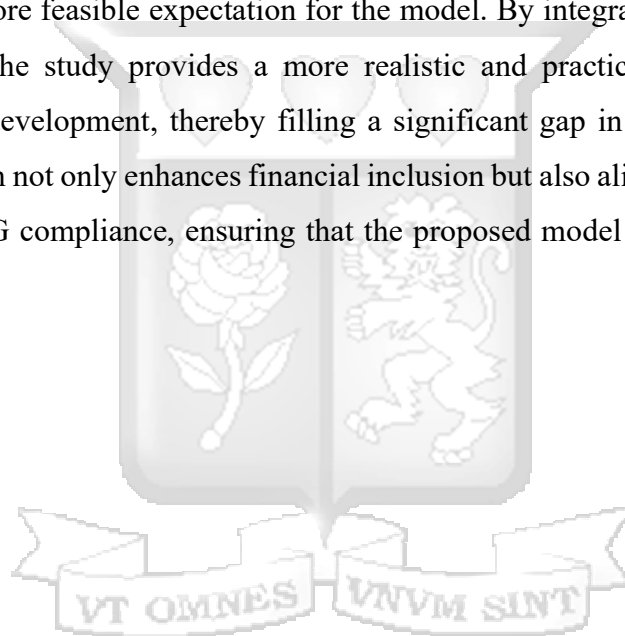
### **2.3 Research Gap**

While the existing literature provides a robust foundation, several gaps remain that this study aims to address. Specifically, there is a lack of research integrating ESG principles into insurance products in the context of Kenya. This study addresses these gaps by proposing this insurance model, implementing social governance principles,



and providing empirical analysis based on real-world data, thereby not only bridging this gap but also demonstrating the practical application of ESG principles—particularly social governance—in a Kenyan context. By leveraging Bonga Points, the model enhances financial security for the everyday Kenyan parent or guardian, capitalizing on existing consumer behaviour patterns without necessitating drastic changes.

Furthermore, Kariuki (2021) identified several limitations in using Bonga Points for pension schemes, particularly concerning the adequacy of current mobile phone expenditure patterns and conversion rates to meet desired pension amounts. This study aims to address these limitations by targeting the funding of indirect education costs, which is a more feasible expectation for the model. By integrating Bonga Points into this model, the study provides a more realistic and practical solution to support educational development, thereby filling a significant gap in the existing literature. This approach not only enhances financial inclusion but also aligns with contemporary trends in ESG compliance, ensuring that the proposed model is both innovative and sustainable.



## **CHAPTER THREE: METHODOLOGY**

This chapter outlines the research methodology of the study. It covers the research design, population of the study, sampling methods used, data collection methods and data analysis techniques

### **3.1 Research Design**

This study employs a quantitative research design, incorporating secondary data analysis to evaluate the feasibility and effectiveness of the education insurance model. The quantitative component involves the use of a statistical model that is, the Vasicek model to forecast future interest rates which will be applied to inflate education costs appropriately. These projections will then be checked against the value of Bonga points accumulation to assess the financial viability of the insurance product at specified time intervals.

### **3.2 Choice of Design and Justification**

A quantitative design, supplemented with historical data, allows for precise calculations and forecasting essential for model development and validation. This approach enhances reliability and accuracy in measuring the projected impact, considering it uses extensive, real-world data.

### **3.3 Population and Sampling Techniques**

The study's population is defined as individuals in the Kenyan populace. The analysis will draw on secondary datasets reflecting this target demographic, as provided by national statistics and financial records. Data will be segmented by age, income, and urban vs. rural residence to mirror population diversity.

### **3.4 Data Type, Sources, and Methods of Collection**

Secondary data used includes:

- **Financial data** from the Central Bank of Kenya, covering inflation rates, interest rates, and other macroeconomic indicators.

- **Expenditure data** from sources such as survey data from Kariuki's study, and the Ministry of Education for mobile expenditure on bonga points, as well as educational costs respectively.

This study will cover **data from 2013 to 2023** to establish a recent, accurate basis for analysis and projections.

### **3.5 The model**

#### **3.5.1. Assumptions**

- i. Bonga point accumulation is assumed to have started when the model is taken up by an individual. Previous points accumulated are not considered in this model.
- ii. The model assumes individuals have a lifestyle that supports regular mobile transactions, enabling them to accumulate Bonga points with a relatively constant pattern.
- iii. Bonga points accumulated are not used for any other transactions.

#### **3.5.2 ESG Framework Integration**

- Environmental considerations considered for this model involve administration that has minimal negative environmental impact. This is mainly due to the fully digital documentation that reduces paper use.
- As for social impact, the models focus on improved accessibility and the possibility of passive funding to provide coverage for such a useful niche product.
- Implementation of transparent governance structures for the insurance model, including regular audits and stakeholder reporting in the form of regular fund updates and alerts.

### 3.5.3 Estimation of Model Parameters

#### Inflation Rates

The analysis employs inflation rates as annual inflation rates data from commercial banks, sourced from the Central Bank database, to construct a robust forecast model. The Vasicek Model was chosen for its ability to capture the stochastic properties and mean-reverting behaviour exhibited by interest rates. This sophisticated model predicts future interest rate movements by incorporating current market volatility, market risk factors, and the long-run mean level. The model can be applied in a similar way to inflation rates.

(Vasicek, 1977) introduced the Vasicek Model which is elegantly expressed through the following stochastic differential equation:

$$r_t - r_{t-1} = a(b - r_{t-1})dt + \sigma dW_t \quad (\text{Equation 3})$$

Where:

- $r_{t-1}$  is the rate at time t-1.
- $r_t$  is the rate at time t.
- $a$  is the speed of reversion to the mean.
- $b$  is the long-term mean level.
- $\sigma$  is the volatility of the process.
- $W_t$  is a Wiener process or Brownian motion.

To forecast future interest rates, we estimate the volatility of the process ( $\sigma$ ), and the pullback rate/ speed of reversion to the mean ( $a$ ) and long-term mean ( $b$ ) by regressing  $r_{t+1}$  against  $r_t$ . The resulting standard error, gradient, and intercept are then utilized to solve for  $\sigma$ ,  $a$ , and  $b$ .

#### Conversion Rate

To determine the conversion rate to be used to redeem Bonga Points into cash, the study suggests varying conversion rates from the traditional rate of one Bonga Point for every 10 Kshs spent on airtime, SMS, and bundles, to determine a feasible rate.

### 3.5.4 Feasibility Equation

To check the feasibility of the model, we compute the ratio of the inflated education expenditures to the value of Bonga Points accumulated at time t, at intervals t of 2, 4, 6, 8, 10, 12, and so on.

Let:

- $C_t$  be the inflated education expenditures at time t.
- $BP_t$  be the value of Bonga Points accumulated at time t.
- $V_t$  be the conversion value of Bonga Points at time t.

The feasibility condition is:

$$\frac{V_t * BP_t}{C_t} \geq 1 \quad (\text{Equation 4})$$

where  $t = 2, 4, 6, 8, 10, \dots$  years

If the ratio is equal to or greater than 1 then the model is feasible to fund the costs by that point in time. That is to say, the value of Bonga points at time t is greater than or equal to the value of inflated education expenditures at time t. The model will be considered overall feasible as long as it meets this mark for at least 90% of the time intervals.

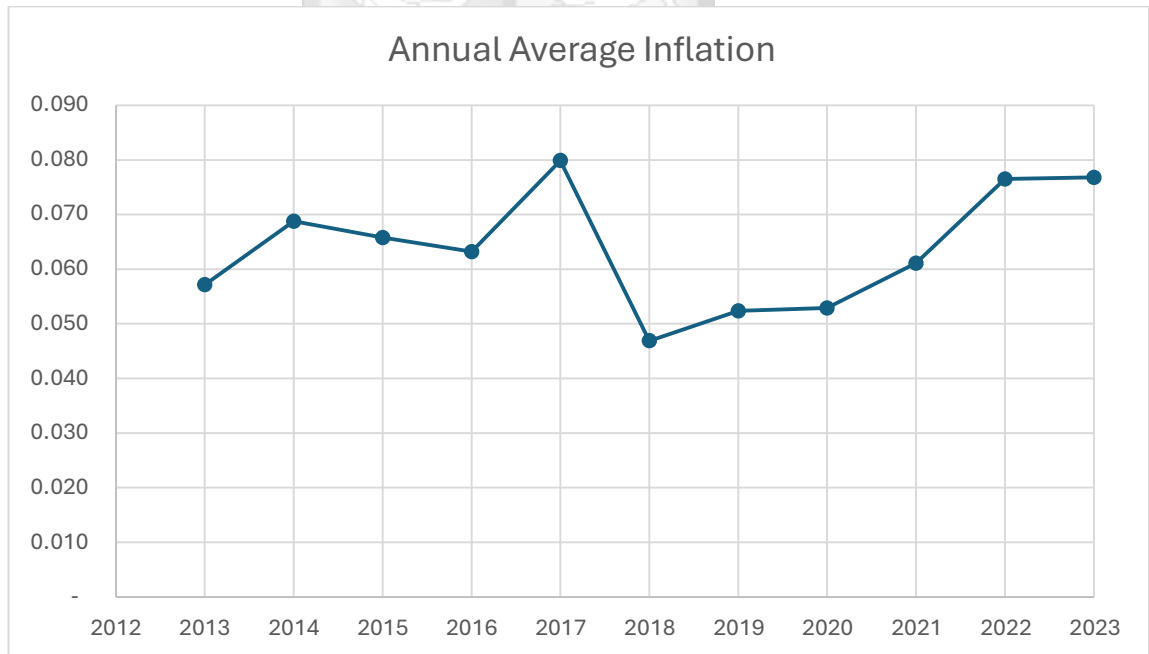
## CHAPTER 4: RESULTS AND ESTIMATIONS

### 4.1 Introduction

This chapter encompasses secondary data analysis results and interpretation aimed at evaluating the feasibility and effectiveness of the education insurance model. The quantitative component involved the use of a statistical model, that is, the Vasicek model to forecast future inflation rates which will be applied to inflate education costs appropriately. These projections were checked against the value of Bonga points accumulation at specified periods to assess the financial viability of the insurance product at specified time intervals. Tables and figures were used in the presentation of the results.

### 4.2 Inflation rates

The following is a graph of the historical inflation rates 2013-2023 obtained from CBK data:



*Figure 1 Graph of Inflation Rates*

The graph shows Kenya's historical inflation rates from 2013 to 2023 and reveals notable peaks around 2017 and 2022, indicating periods of higher inflation. These

peaks could have been driven by the then-global supply chain disruptions, the Russia-Ukraine war, and currency depreciation, which raised fuel, food, and import costs. Internally, political instability, corruption, rising taxes, cartels' price manipulation, and high public debt could have further worsened inflation.

Conversely, there was a significant dip around 2018, suggesting a period of lower inflation due to improved agricultural output leading to lower food prices. Overall, the trend line shows fluctuations, reflecting the variable nature of inflation rates over the decade. This visualization underscores the economic changes Kenya experienced, with inflation rates varying significantly from year to year.

#### 4.2.1 Vasicek model forecasting of inflation rates.

Historical rates shown above are regressed onto each other by regressing inflation rates from the current period to those in the corresponding previous period to obtain the regression estimates below.

*Table 1 Regression estimates*

| <i>Regression Statistics</i> |         |
|------------------------------|---------|
| Intercept                    | 0.0534  |
| Gradient                     | -0.8235 |
| Standard error               | 0.0119  |

To estimate the parameters, we discretize this continuous-time model, approximating the change in rates over discrete time intervals:

$$r_t - r_{t-1} = a * b * \Delta t - a * \Delta t * r_{t-1} + \delta * \sqrt{\Delta t} * \varepsilon_t \quad (\text{Equation 3})$$

Where:

- $r_{t-1}$  is the interest rate at time t-1.
- $r_t$  Is the interest rate at time t.

- $a$  is the speed of mean reversion.
- $b$  is the long-term mean interest rate
- $\Delta t$  is the change in time between  $t$  and  $t+1$  (i.e. 1 year)
- $\delta$  is the volatility
- $\varepsilon_t$  Is a random variable drawn from a standard normal distribution.

Equation 3 suggests a linear relationship between  $r_t - r_{t-1}$  (change in rates) and the  $r_{t-1}$  (lagged rate), which can be estimated using OLS regression.

$$r_t - r_{t-1} = \text{Intercept} + \text{Slope} * r_{t-1} + \text{Error term} \quad (\text{Equation 4})$$

We utilise the regression estimates in Table 1 to estimate the model parameters as follows.

The gradient of the regression is equal to  $-a$ , the intercept  $C$  to  $(a * b)$  and the standard error to  $\frac{\delta^2}{2a} (1 - e^{-2a\Delta t})$  as suggested by model parametrization. The solution for the pullback rate (**a**), the long-term mean rate (**b**) and volatility ( $\delta$ ) are as shown:

*Table 2 Inflation Rate Parameter Estimates*

| Parameters                   |          |
|------------------------------|----------|
| <b>A</b>                     | 0.823483 |
| <b>b</b>                     | 0.06485  |
| <b><math>\delta^2</math></b> | 0.000232 |
| <b><math>\delta</math></b>   | 0.015219 |



### 4.3 Education Costs

*Table 3 Indirect Education Costs 2023*

| Year: 2023                                                                    | Costs (Kshs.) |
|-------------------------------------------------------------------------------|---------------|
| Day-schoolers                                                                 | 12,900        |
| Boarding category A- Nairobi, Thika, Nakuru, Mombasa, Kisumu, Eldoret, Nyeri. | 21,169        |
| Boarding category B -other county schools                                     | 13,150        |
| Special needs                                                                 | -             |
| Average                                                                       | 15,740        |

\*Only includes other vote-heads, medical/ insurance, and activity fees to be covered by parent/guardian.

Source: Ministry of Education 2023 fee structure guidelines.

### 4.4 Bonga Points

This study operates in a scenario without Safaricom's 3-year bonga point expiry that was issued in 2023.

According to Kariuki (2021), the data collected from a survey on mobile money expenditure found that on average, individuals' mobile expenditures were at an average of KShs. 754.30 per month. Adjusting this figure to today's terms considering inflation in airtime and bundle costs, this study will consider the average monthly spend to be Kshs. 927.79

#### 4.5 Conversion Rate and Feasibility

The lowest conversion rate Safaricom can offer would be 1:1, meaning 1 Bonga point equals 1 Ksh. While this rate maximizes the value for customers, it may not be sustainable for Safaricom from a business perspective, as it could lead to excessive financial strain or reduced profitability. To balance customer value and business sustainability, Kariuki's study proposes a more conservative conversion rate of 1:3.33, where 1 Bonga point equals 0.33 Ksh. However, under this rate, none of the feasibility test results exceed a ratio of 1, hence do not reach the required 90% threshold needed for feasibility. This indicates that a rate of 1:3.33 is too restrictive and does not adequately meet the feasibility criteria for most periods.

In contrast, a conversion rate of 1:1.467 achieves a balance between feasibility and practicality. At this rate, 90% of the results from the feasibility test exceed the target ratio, successfully meeting the threshold. This makes 1:1.467 an optimal rate for the model, as it ensures both customer satisfaction and business viability. Furthermore, this rate aligns with the projected growth of accumulated Bonga points, as shown in the forecasts, enabling customers to offset costs effectively while allowing Safaricom to maintain its profitability.

A reasonable conversion rate would fall within the range of 1:1 to 1:1.467. This range represents a practical compromise, providing sufficient value to customers without undermining Safaricom's business sense.

### 4.5.1 Forecasted Values

At the conversion rate of 1:1.467, the graph below shows the corresponding forecasts till 2040.

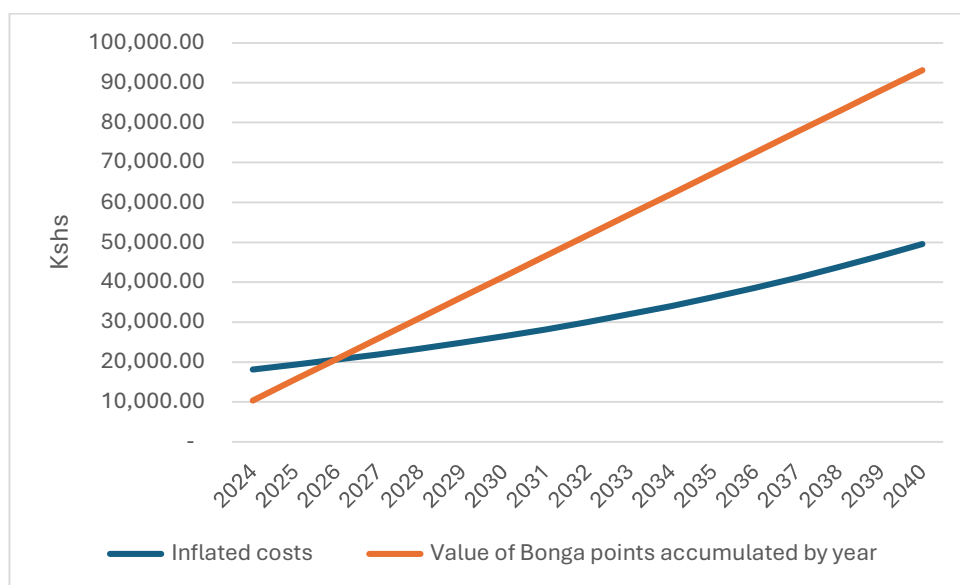


Figure 2 Graph of inflated costs vs bonga points accumulated.

The graph compares the **inflated costs** and the **value of accumulated Bonga points** from 2024 to 2040, highlighting their projected growth over time. The blue line represents the inflated costs, which increase steadily at a moderate rate due to inflation. In contrast, the orange line, representing the monetary value of Bonga points at a conversion rate of 1:1.467, grows significantly faster. Initially, in 2024, both values are relatively close, but from 2025 onwards, the value of Bonga points begins to outpace the inflated costs, leading to a substantial divergence over the years.

By 2030, the value of accumulated Bonga points surpasses the inflated costs, creating a surplus that continues to grow. This gap widens further by 2040 when the Bonga points' value is almost double the projected inflated costs. This pattern demonstrates the potential of Bonga points as a reliable and effective tool for offsetting future expenses. Their rapid growth compared to inflation highlights the benefits of long-term accumulation, making them a potentially valuable financial asset.

The results emphasize the significant opportunity to use Bonga points as part of a broader financial planning strategy. By consistently accumulating and redeeming these points, individuals could not only manage the impact of inflation but also generate surplus value for greater periods and additional purposes. This surplus could provide flexibility for managing unforeseen expenses or enhancing savings. However, it is essential to consider that these projections rely on assumptions of a fixed conversion rate, steady accumulation, and relatively constant inflation.



## **CHAPTER 5: CONCLUSION, LIMITATIONS, AND RECOMMENDATIONS**

### **5.1 Conclusion**

This study proposed an ESG-aligned education insurance model leveraging Safaricom's Bonga Points as a funding mechanism to address indirect education costs, such as transportation, uniforms, and school supplies, through a passive funding strategy accessible to a broad demographic. Using the Vasicek model, future inflation rates were forecasted to account for inflated education costs, while feasibility tests evaluated the viability of Bonga Points under various conversion rates. The findings revealed that a conversion rate of 1:1.467 balances customer value with Safaricom's business sustainability, achieving a feasibility threshold of 90% across the forecast period. This validates the model's potential to mitigate financial burdens while promoting financial inclusion, social equity, and ESG principles. By leveraging Bonga Points to fund education costs, the proposed model fosters social equity, financial inclusion, and sustainability, providing a blueprint for integrating loyalty programs into innovative financial products. Future research and stakeholder collaboration will be vital in scaling this initiative and transforming education financing in Kenya.

### **5.2 Limitations of the Study**

While the study presented promising results, several limitations should be acknowledged.

1. The study relied on secondary data sources, which may not fully capture the nuances of individual spending habits and variations in Bonga Point accumulation patterns.
2. Key assumptions, such as fixed conversion rates, and uninterrupted Bonga Point accumulation, may not hold in real-world scenarios, potentially affecting the model's outcomes.
3. The conversion rate 1:1.467 suggested, though feasible may not be a rate Safaricom is willing to offer. Higher rates showed unfeasible results, which poses a major threat to the model overall.

### 5.3 Recommendations

To enhance the applicability and scalability of the proposed model, the following recommendations are made:

1. Future research should incorporate primary data collection to better understand consumer spending patterns, accumulation rates, and potential behavioural changes.
2. Expanding the model to include direct education costs, through supplementary funding mechanisms could enhance its impact.
3. Incorporation of conversion rates by other network providers.



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