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Digital Economy under Fintech Scope: Evidence from African Investment

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Abstract: The digital economy has revolutionized industries worldwide, prompting companies to invest in digital technologies to enhance productivity and profitability. However, the successful implementation of these technologies hinges on employees' perceptions and satisfaction with the digital infrastructure. This paper aims to explore the impact of digital technology satisfaction on overall job satisfaction within the fintech domain. Drawing from the User-Task-Technology fit framework, it investigates the interplay between digital technology satisfaction, job satisfaction, and work-life balance. By aligning technology with task requirements and individual user needs, organizations can foster a positive work environment and improve firm performance. The study employs Principal Component Analysis (PCA) to identify key requirements for the digital economy in a digital environment. Furthermore, it addresses two research questions related to the selection of variables representing sustainability dimensions and evaluating dependency in digital economy projects under a fintech scope. The findings highlight the importance of digital technology satisfaction in driving employee job satisfaction and overall work experience. Ultimately, this research contributes to a deeper understanding of the factors influencing the digital economy and offers insights for managers and organizations seeking to optimize their digital transformation strategies. The study concludes by exploring the digital economy in the context of healthcare services in Africa, specifically focusing on the initiatives led by the World Bank.

Keywords: digital economy; job satisfaction; work-life balance; finTech; User-Task-Technology fit; Principal Component Analysis (PCA); sustainability

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1. Introduction

The digital economy has significantly accelerated digital transformation across various industries, including agriculture, industry, and services. This transformation has had a profound impact on the development of these sectors. In order to capitalize on the opportunities presented by the digital economy, companies are increasingly investing in digital technologies to empower their employees and drive profitability [1].

When organizations establish a digital infrastructure, it becomes imperative to consider how employees perceive these digital technologies. This perception is closely linked to several important aspects, such as work-environment satisfaction [1], job satisfaction [2], job involvement [3], firm performance [4], and work-life balance [5]. Employee satisfaction is widely recognized as a critical outcome in the digital workplace. Companies assess job satisfaction as it is closely associated with performance ratings based on factors such as individual productivity improvement, error reduction, absenteeism, turnover, and more.

Fintech can improve both financial stability and access to services [6]. According to Hanaysha [7], there exists a strong correlation between satisfaction with digital technology and job satisfaction regarding access to services. In the digital era, where digital platforms have permeated almost all industries, the experience of using these technologies has become an integral part of employees' overall work experience. When employees are satisfied with the digital technology they use, they are better equipped to adapt to the ever-changing

work conditions imposed by the digital landscape, ultimately leading to enhanced job satisfaction [8].

Therefore, it can be inferred that satisfaction with digital technology has the potential to positively influence overall job satisfaction relying on Fintech scopes, as depicted in Figure 1.

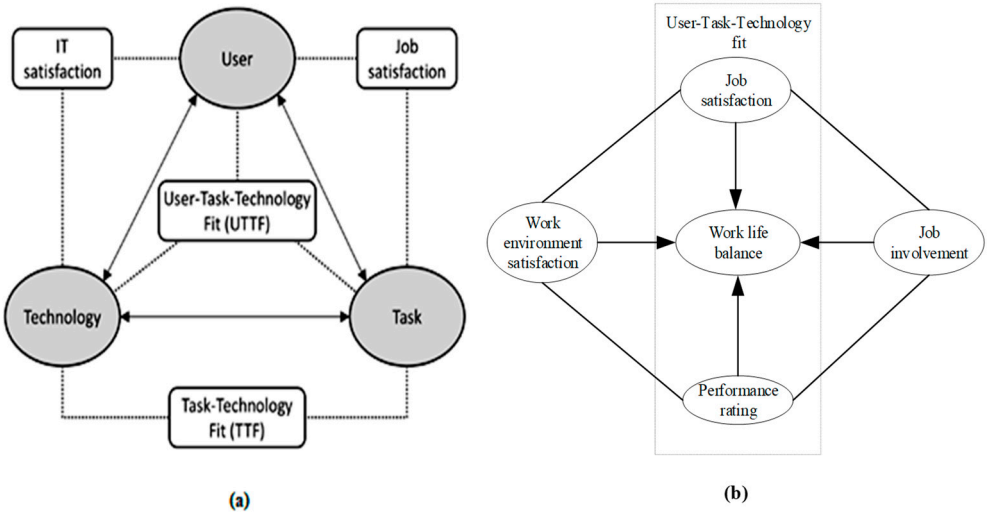

Figure 1. The research framework of digital economy under fintech scope adopted from the research framework from User-Task-Technology fit (Source: adapted from [1] (p. 343)).

Digital technologies have the capacity to enable employees to handle complex tasks while reducing the burden of tedious and repetitive tasks. Moreover, satisfaction with digital technology can enhance users' sense of control over their work, leading to improved firm performance by generating benefits such as cost savings, increased connectivity, and greater agility and adaptability in complex and competitive environments [9]. To fully leverage the potential of digital technologies and achieve optimal firm performance, it is crucial to align technology with the specific task requirements and the work environment of individual users [10]. Task-technology fit (TTF) refers to the alignment of the tasks performed and the technology utilized [11], while user-task-fit technology extends the TTF theory by considering employees' needs for both immediate task accomplishment and work-environment satisfaction, which contributes to ensuring work-life balance [12] (see Figure 1a). Given that jobs constitute a significant part of people's lives, companies must strive to maintain work-life balance, which is the harmony between job satisfaction and life satisfaction [5], as depicted in Figure 1b.

Building upon these findings, this research aims to make two primary contributions. Firstly, it seeks to identify common factors influencing the digital economy from the perspectives of both managers and employees. Secondly, it aims to illustrate the interrelationships among the requirements of the digital economy. Consequently, this paper addresses the following research questions:

How can variables be selected to represent the three dimensions (social, economic, and environmental) of sustainability in the context of the digital economy?

How can dependency (referring to the evaluation of reliance on external factors, resources and stakeholders) be evaluated at different stages of a digital-economy project under a fintech scope?

To address these questions, this project on healthcare services, supported by the World Bank in Africa, is presented as leveraging fintech solutions and technologies, such as electronic health records, telemedicine platforms, health data analytics, digital payment systems for healthcare services, and digital insurance solutions, in order to drive digital transformation and innovation within the healthcare sector, ultimately improving healthcare service delivery and accessibility. Hence, "Fintech", in the context of the dig-

ital economy project supported by the World Bank in Africa, refers to the integration of innovative financial technology solutions within the healthcare sector, aiming to optimize financial management, improve decision-making, and streamline financial transactions through the application of digital tools and platforms. It involves leveraging technology to enhance financial efficiency, transparency, and accessibility in healthcare services. Principal Component Analysis (PCA) is used to identify the key requirements of the digital economy within a digital environment.

The rest of this research paper is planned as follows. After presenting an overview of the digital economy in terms of its social, economic, and environmental dimensions in Section 1, Section 2 presents the research methodology. Section 3 explores the digital economy of healthcare services in Africa led by the World Bank. Section 4 concludes the paper.

2. Materials and Methods

This paper aims to assess the current state of digital-economy development through virtual organized projects. It selects key indicators from three dimensions: economy, social, and environment. The Principal Component Analysis (PCA) method is used to evaluate the quality of the digital economy at two stages of digital transformation, namely the investment and development phases. Additionally, the paper explores the interactions that exist between two phases of the World Bank project. The PCA analysis is conducted on relevant factors derived from World Bank projects in Africa, specifically in the context of healthcare services. The analysis is implemented and performed using the R software.

The primary goal of the World Bank in Africa is to digitize healthcare services. As such, the World Bank develops two types of projects, Investment Project Financing (IN) and Development Policy Loan (AD). It aims to ensure sustainable development through financial investment with blockchain solution (IN) and emphasizes development lending (AD). In this paper, we utilize PCA to illustrate the requirements for AD and IN in the digital transformation process, focusing on three sustainability perspectives: economic (such as costs for technology investment, including software and hardware, and costs for employee training), environmental (including ratings for environmental satisfaction, job satisfaction, and job involvement), and social (evaluating work-life balance and performance ratings). Therefore, a total of ten observed variables were considered, covering 700 categories of healthcare services across Africa.

Table 1 suggests that there are significant differences between actual and forecasted values for various project-related costs and employee-related factors. Here are some observations from the table:

- Project Type: There are two types of projects (F). The World Bank is helping African countries develop their social services by supporting them in digitizing theses services. As such, it develops two types of projects, IN and AD, which aim to guarantee sustainable development and poverty reduction. Most of the investments, with 96.43% of the total projects, relate to the financing of investment projects (IN). However, this shows that certain activities within the projects are in the digitalization phase, while others are in the digital transformation stage.
- Further details about these project types are not available in the table.
- Project Cost: The average project cost is 137,714,386 with a standard deviation of 836,417,787. The p-value is less than 2.2×10^{16}, indicating a significant difference between actual and forecasted project costs.
- Hardware, Software, and Total Costs: Similar to project costs, the average costs for hardware, software, and total costs are provided along with their respective standard deviations. The p-values for all these variables are less than 2.2×10^{16}, suggesting significant differences between actual and forecasted costs.
- Training Costs: The average training cost is 3,665,771 with a standard deviation of 13,365,251. The p-value is less than 2.2×10^{16}, indicating a significant difference between actual and forecasted training costs.

Table 1. Descriptive analysis.

	Var. Type	Mean	Sd	*p*-Value	Obs.
Project type	F	-	-	-	2
DN	N	-	-	-	-
Project cost	N	137,714,386	836,417,787	$<2.2 \times 10^{16}$	700
Hardware	N	5,819,286	37,466,464	$<2.2 \times 10^{16}$	700
Software	N	67,652,629	110,124,388	$<2.2 \times 10^{16}$	700
Total costs	N	72,764,771	112,045,596	$<2.2 \times 10^{16}$	700
Training costs	N	3,665,771	13,365,251	$<2.2 \times 10^{16}$	700
Environment satisfaction	N	2.7085714	1.1261926	$<2.2 \times 10^{16}$	700
Job satisfaction	N	2.7314286	1.1140336	$<2.2 \times 10^{16}$	700
Job involvement	N	2.7171429	0.7216202	$<2.2 \times 10^{16}$	700
Work life balance	N	2.7485714	0.7273018	$<2.2 \times 10^{16}$	700
Performance rating	N	3.1628571	0.3694993	$<2.2 \times 10^{16}$	700

Note: N = Number, F = Factor.

3. Results

This paper investigates three models that are in line with the two project categories AD and IN. First, PCA considers both categories of projects to analyze the trends of each variable (project cost, hardware, software, training cost, total cost of hardware and software, environment satisfaction, job satisfaction, job involvement, work-life balance, performance rating).

3.1. Model 1: AD and IN

Figure 2 presents a visualization of the ten variables, with some individuals showing a significantly positive coordinate on the axis, while others are represented by a notably negative coordinate (to the left of the graph). This graphical representation highlights the variables that are most effectively captured on the map and contribute to the construction of the Principal Component Analysis (PCA) plan. The figure reveals that the PCA plan is primarily influenced by job satisfaction, training costs, performance rating, and variables with high values, such as software and total costs. Additionally, project cost, work-life balance, and hardware demonstrate a strong correlation.

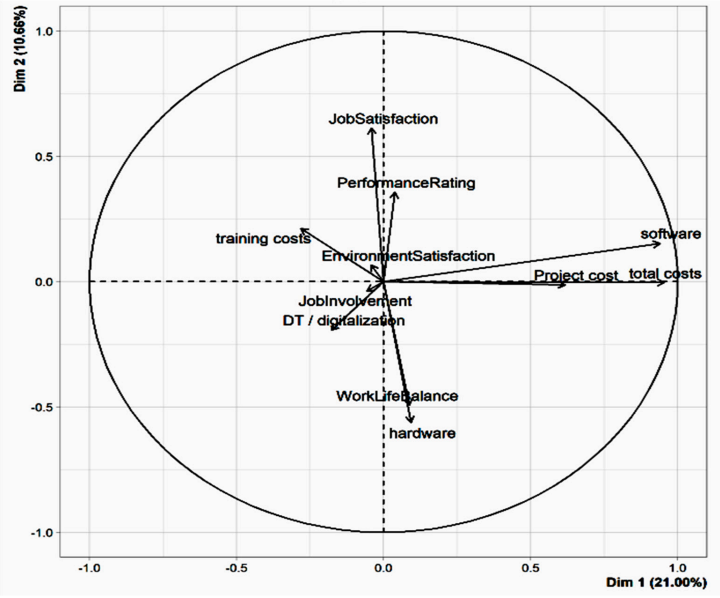

Figure 2. Variables' factor map. Note: This biplot provides information about which variables provide the largest contribution to the component: (1) A high absolute value (towards 1 or −1) indicates that the variable strongly influences the component. Values close to 0 indicate that the variable has a weak influence on the component. (2) The sign of a loading (+ or −) indicates whether a variable and a principal component are positively or negatively correlated.

3.2. Model 2: AD without IN

Based on an estimation of the optimal number of axes for interpretation, it is suggested that one focus the analysis on describing the first axis. Indeed, it exhibits a higher amount of inertia compared to what would be expected from random distributions at the 0.95-quintile level (34.6% versus 26.82%), as depicted in Figure 3.

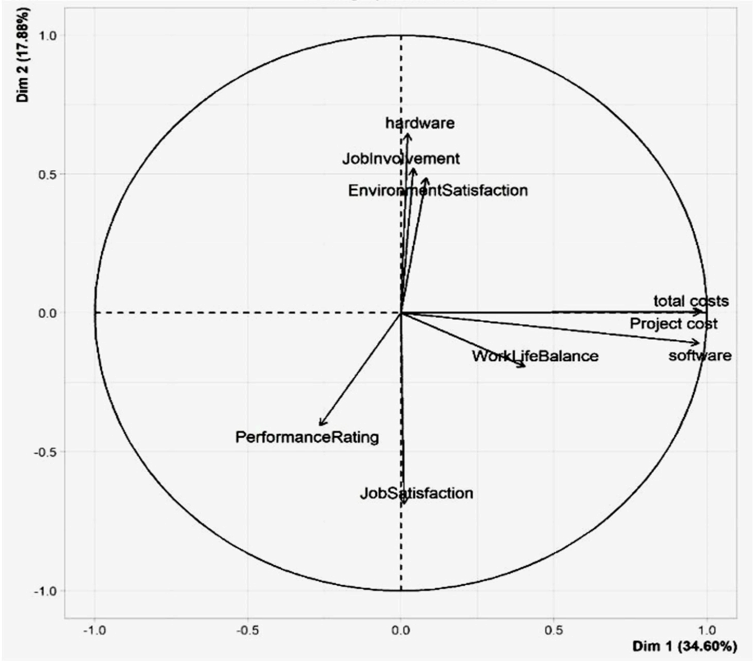

Figure 3. Variables' factor map. Note: This biplot shows the most correlated variables for Development Policy Loan (AD) projects. The objective of the loadings in the biplot is to retrieve more insights on the variation of the features and separability of the classes in relation to the principal component.

In this particular model, the most significant investments are directed towards software and hardware. This emphasis on software and hardware can be attributed to the total costs and project cost dedicated to the development and maintenance of the technology infrastructure.

Note that project-cost, software, and total-cost variables exhibit high correlations with this dimension, with respective correlation coefficients of 0.98, 0.97, and 0.98. These variables can effectively summarize the characteristics of dimension one, as illustrated in Table 2. By focusing on variables such as total costs, project costs, and software, the fintech scope within healthcare services can effectively address cost challenges, optimize project expenditures, and harness the power of technology to deliver innovative and efficient healthcare solutions. Within AD, African healthcare services are, at a digital stage, employing cost-effective strategies, managing project budgets, and leveraging cutting-edge software. The work-life balance came in the second step (showing a correlation coefficient of 0.41), suggesting that there is a tendency for it to be positively associated with economic variables. This implies that prioritizing and promoting a healthy work-life balance for healthcare professionals can have beneficial implications for managing project budgets, optimizing costs, and harnessing the potential of technology within healthcare services.

Table 2. Correlation matrix retrieved from dimension 1 of factor map.

	Correlation	*p*-Value
Total costs	0.9834795	1.414754×10^{18}
Project cost	0.9780937	3.536449×10^{17}
Software	0.9733558	3.284126×10^{16}
Work-life Balance	0.4046043	4.483796×10^{2}

3.3. Model 3: IN witout AD

In this particular model, the focus is on IN projects, where investments of the World Bank are allocated towards technology and employees. This model is reflected in the hierarchical classification of three distinct clusters, as illustrated in Figure 4.

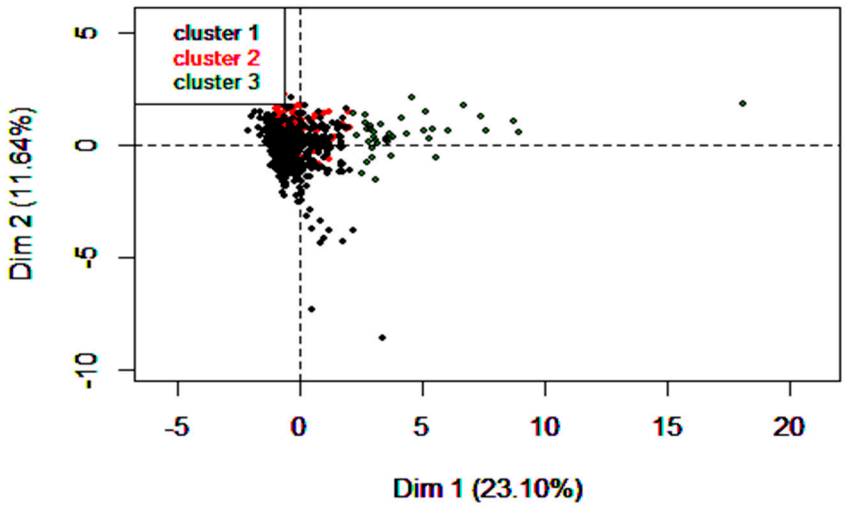

Figure 4. Ascending hierarchical classification of variables. Note: These clusters provide a comprehensive understanding of the World Bank's investment strategy in IN projects, emphasizing the importance of technology, employee training, performance evaluation, and well-being of employees in achieving the desired outcomes and impact in the healthcare services sector.

The first cluster represents the convergence of human capital and technology infrastructure. It includes variables such as training costs and hardware. This cluster underscores the importance of investing in employees' skills and competencies, as well as providing their work in the digital economy. It highlights the significance of empowering employees with the right tools and knowledge to enhance their performance.

The cluster 2 is characterized by the Performance Rating variable. This variable indicates that the World Bank evaluates the outcomes and results of its investments in the healthcare services sector. It serves as a measure of effectiveness and allows the World Bank to track its efforts and assess the impact of its initiatives in improving healthcare services. This cluster reflects the organization's commitment to monitoring and evaluating the success of its investments.

The third cluster comprises variables such as software, total costs, and project cost. It emphasizes the World Bank's focus on equipping healthcare services employees with appropriate work tools and promoting their well-being. The inclusion of software, total-cost, and project-cost variables highlights the organization's commitment to enhancing the digital infrastructure and supporting employees' effectiveness and satisfaction in their work.

4. Discussion and Conclusions

By considering the implications of variables such as job satisfaction, training costs, performance rating, and software and total costs, the fintech scope in healthcare services can thrive within the digital economy. Prioritizing employee satisfaction, investing in training programs, establishing a performance-driven culture, and optimizing software and costs will enable fintech professionals to develop innovative solutions that enhance healthcare delivery, improve patient outcomes, and contribute to the overall digital transformation of the healthcare industry.

The findings in Figure 2 demonstrate that within the fintech scope of the project, job satisfaction emerges as a crucial element, emphasizing the importance of creating a supportive work environment and investing in employee training to drive engagement and the successful implementation of fintech tools. The effective management of training costs ensures that healthcare professionals in Africa possess the necessary skills to leverage and adapt to fintech advancements. A robust performance evaluation system helps measure the impact of fintech solutions and identify areas for improvement. Moreover, optimizing software utilization and managing total costs contribute to a cost-effective implementation and efficient resource allocation. By considering these implications, the World Bank's project can leverage fintech to enhance healthcare service delivery in Africa, fostering improved patient care and contributing to the overall development of the healthcare sector.

As the models 2 and 3 reveal strong dependencies with economic perspectives, the correlation analyses attempt to emphasize the dependency degree between variables within the two types of Word Bank projects AD and IN. Figure 5a,b shows a strong correlation among four variables in terms of social and environmental dimensions of the digital economy in Africa, which is stronger in relation to IN. This situation is mostly explained by the investment of the World Bank in employee training. Additionally, the analyses reveal that the performance rating is less correlated than other variables, which is explained by the fact that the project is still undergoing the digitalization process (see Figure 5c,b).

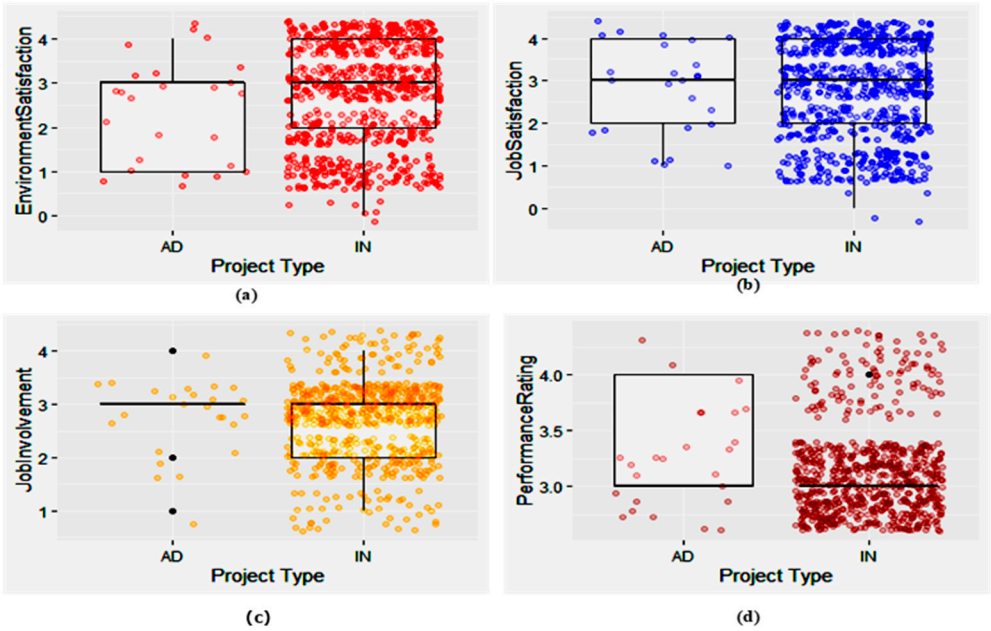

Figure 5. Correlation graphs for AD and IN projects among principle components variables.

The primary objectives of this study are twofold: first, to propose and test an integrated model that enhances and improves the understanding and evaluation of the digital economy in practical settings; and second, to explore the phenomenon of digital transformation and digitalization in Africa within the context of an international corporation under a fintech

scope. Additionally, the study aims to extract valuable lessons from empirical findings that can inform and enhance digital economy practices.

To achieve these objectives, the models have identified several key lessons. Firstly, the results emphasize the importance of focusing the evaluation of digital-economy projects on social and environmental aspects, taking into account the interests of stakeholders who have a close involvement in the project. This approach ensures that sustainability considerations are effectively incorporated into the evaluation process.

Secondly, the results highlight the need to differentiate between projects based on their unique goals, objectives, and constraints before evaluating digital transformation and digitalization. By recognizing the specific characteristics of each project, the evaluation process becomes more meaningful and enables a deeper understanding of the implications and outcomes of the digital-economy initiatives.

Finally, practitioners can improve their digital-economy practices and make informed decisions regarding digital transformation and digitalization initiatives under fintech solution in healthcare services.

Furthermore, fintech innovations, such as blockchain-based platforms for secure transactions or digital payment systems, can contribute to greater transparency, efficiency, and accountability within investment projects. These advancements can streamline financial operations and contribute to more reliable performance-rating assessments.

The use of technology enables improved decision-making, ensuring that projects align with social sustainability goals by prioritizing work-life balance and job satisfaction among their workforces. This can be achieved by leveraging digital tools and platforms that facilitate flexible work arrangements, remote collaboration, and employee engagement. By providing a supportive work environment that promotes work-life balance, organizations can enhance employee well-being, job satisfaction, and overall productivity. By prioritizing work-environment satisfaction and providing employees with the necessary tools and resources, organizations can foster a sense of responsibility and engagement in environmental sustainability efforts.

By embracing financial fintech within the digital economy, African organizations can enhance their competitive edge, drive sustainable growth, and navigate the digital landscape more confidently while addressing the economic, social, and environmental dimensions of sustainability. By integrating financial fintech insights, organizations can leverage the power of technology to optimize financial management, improve decision-making, and mitigate risks in investment projects. This integration enables a more comprehensive evaluation framework that encompasses both financial and technological aspects, enhancing the overall understanding and effectiveness of the digital economy in the African context.

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Data Availability Statement: Archived dataset analyzed from World Bank project on healthcare services in Africa is available at: https://www.kaggle.com/datasets/soniakh89/fintech-health-service-from-wb-in-africa, accessed on 1 March 2023.

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