FOCUS ON RESEARCH IN CONTEMPORARY ECONOMICS

VOLUME 6 ISSUE 1

FOCUS ON RESEARCH IN CONTEMPORARY ECONOMICS (FORCE)

www.forcejournal.org

ISSN: 2717-817X

FOCUS ON RESEARCH IN CONTEMPORARY ECONOMICS

ABOUT THE JOURNAL

Founded in 2020, the FORCE is a double-blind, peer-review scientific journal that aims to create a well-established venue for high quality research in contemporary Economics.

Its content mirrors widespread scholarly approaches and interests within the dimensions of Economics, Finance, Accounting, Banking, Business Administration, Marketing, Management, Political Science and other related areas in Social Sciences.

The FORCE also welcomes contributions from officials with international and governmental agencies together with non-governmental organizations.

Published biannually (Summer and Winter), the FORCE is designed to reflect a balanced representation of authors from different regions of the world. The opinions and views expressed in the FORCE are those of the authors, and do not necessarily reflect the positions of the editors, editorial board and advisory board.

Indexing and Abstracting
- Academic Resource Index- ResearchBib
- Advanced Science Index (ASI)
- ASOS Index
- Citefactor Academic Scientific Journals
- Directory of Research Journal Indexing (DRJI)
- Directory of Open Access Journals (DOAJ)
- Eurasian Scientific Journal Index (ESJI)
- EuroPub Directory of Academic and Scientific Journals
- Google Scholar
- Index Copernicus
- International Institute of Organized Research (I2OR)
- International Scientific Indexing (ISI)
- MIAR- Universitat de Barcelona Information Matrix for the Analysis of Journals
- ROAD Directory of Open Access Scholarly Resources
- Scientific Indexing Services (SIS)

PUBLISHED ONLINE:
29.08.2025

FOCUS ON RESEARCH IN CONTEMPORARY ECONOMICS

ARTICLE(S)

VOLUME 6 ISSUE 1

EDITORIAL – VOLUME 6 ISSUE 1

The Editors and the Editorial Board are proud to present the first issue of the sixth volume of Focus on Research in Contemporary Economics (FORCE). We are driven to establish FORCE which is dedicated to create a well-established venue for high quality research in contemporary Economics. Its content mirrors widespread scholarly approaches and interests within the dimensions of Economics, Finance, Accounting, Banking, Business Administration, Marketing, Management, and other related areas in Social Sciences. Therefore, FORCE's contributions are not limited to a specific disciplinary philosophy or a particular approach.

This issue features five research articles that report essential findings and implications in Contemporary Economics. In the first article, Taharimul Islam, Furkan Ali, Nur Touhidul Islam, Akib MD Jubair alam, Kunanon Chutipanich, Souad Ouhammou (2025) focuses on integrating advanced technologies like AI, IoT, and biotechnology into Bangladesh's agriculture can overcome resource constraints, climate challenges, and productivity demands to enhance food security, sustainability, and economic resilience despite infrastructure and adoption barriers.

In the second article, Javed Khan (2025) examines whether foreign aid promotes sustainable economic growth and self-sufficiency or fosters dependency, finding through historical, econometric, and case-study analysis (e.g., successful cases like South Korea and Rwanda versus failures like Haiti and DRC) that aid's effectiveness depends on strong governance, institutions, and policies, while calling for reforms to address issues like fungibility and Dutch disease to better support long-term development.

In the third article, Sabriye Çelik Uğuz and Ayhan Gökdeniz (2025) create a comprehensive cultural and artistic inventory of Ayvalık, a district rich in historical monuments, archaeological sites, architectural structures, cultural landscapes, traditional practices, and art venues, while using SWOT analysis to assess its current situation and potential for cultural and art tourism, ultimately proposing applicable and sustainable development solutions.

In the fourth article, Bahati Ilembo, Mary Mwingira (2025) use the ARIMA (0,2,1) model and Box-Jenkins methodology on World Bank GDP data from 1960–2023 to forecast Tanzania's GDP

at current prices, demonstrating its effectiveness for short-term predictions while comparing pre- and post-COVID-19 trends and emphasizing the need to integrate time series forecasting into policymaking amid challenges from inflation, global fluctuations, and structural inefficiencies.

In the fifth article, Mohamed Miras Marzouki (2025) examines financial sector risks tied to stability criteria, critiques the limitations of Basel II, III, and IV frameworks, and proposes complementing them with a forward-looking prudential surveillance system focused on stock market instability and early warning mechanisms to enhance long-term resilience and prevent abrupt, unforeseen crises.

We would like to thank our authors, reviewers, and readers for their continuous support.

Editors

Assoc. Prof. Ferhat TOPBAS

Assoc. Prof. Gokhan DUMAN

Izmir Demokrasi University, Türkiye

FORCE: Focus on Research in Contemporary Economics *2025 - Vol:6 No:1*

Received: 28.02.2025 *Accepted: 14.05.2025* *Published:29.08.2025*

IMPORTANCE AND UTILIZATION OF TECHNOLOGY IN AGRICULTURAL ECONOMICS: EVALUATING THE CHALLENGES & PROSPECT FOR BANGLADESH

Taharimul Islam*
Furkan Ali
Nur Touhidul Islam
Akib MD Jubair alam
Kunanon Chutipanich
Souad Ouhammou.
*Corresponding Author

Email: Taharimul Islam

ORCID: 0000-0001-9545-1995

Abstract

In order to liquidate Bangladesh's agricultural industry to meet rising productivity demands, resource restrictions, and climatic issues, it is imperative that sophisticated technology be integrated into agricultural economics. In order to transform farming methods and guarantee food security, this study investigates the application of biotechnology, the Internet of Things, and artificial intelligence (AI). Crop yield optimization can be achieved through AI-driven farming and real-time monitoring, while competitive positioning and effective resource usage are encouraged by market tactics including value chain analysis and strategic management. Economic constraints, infrastructure deficiencies, and the sluggish adoption of digital technology are impeding Bangladesh's agricultural economy. This essay assesses the potential and difficulties of integrating technology into Bangladeshi agriculture, highlighting how these advancements have the opportunity to revolutionize production and sustainability. The report highlights the potential of technology to address important agricultural restrictions and foster environmental resilience by showcasing case studies in shrimp illness detection, salt-tolerant rice farming, and biogas production.

Keywords: Economics in Agriculture, IoT applications in agriculture, Regression Analysis, Time Series Analysis.

Received: 28.02.2025 Accepted: 14.05.2025 Published:29.08.2025

1. INTRODUCTION

Bangladesh is a developing nation with enormous agricultural economic potential, especially in light of the introduction and development of artificial intelligence (AI) technology. Among the many difficulties facing the nation's agricultural industry, which is essential to its economy, are the need for greater production and environmentally friendly methods. Traditional approaches are becoming less and less effective due to a growing population, scarce resources, and the negative effects of climate change (1). However, the integration of AI and other advanced technologies offers promising solutions to these issues (2).

With real-time data on soil conditions, weather patterns, and crop health, artificial intelligence (AI) technology like precision farming can help farmers in Bangladesh maximize crop output. This can be further improved by Internet of Things (IoT) devices, which enable ongoing monitoring of agricultural surroundings and result in better informed decision-making. Furthermore, advancements in biotechnology can aid in the creation of crop types that are more resistant to environmental stresses, enhancing food security. To fully take advantage of these prospects, Bangladesh must embrace new market strategies and strategic management techniques in addition to technology developments. We can see the growth of agriculture in Bangladesh being slower comparing the GDP through recent years. Similarly, it is visually represented in Figure 1 that how the contribution of agriculture is reducing in the GDP of Bangladesh. The nation can more effectively negotiate the intricacies of international agricultural markets by adopting contemporary market techniques like value chain analysis and market diversification. Conversely, strategic management will be necessary to guarantee that resources be used effectively and sustainably, which will eventually result in higher economic growth (3).

Received: 28.02.2025 Accepted: 14.05.2025 Published:29.08.2025

Year	Total GDP	Agriculture	Share of Agriculture(%)
2015	195.15	28.84	14.8%
2016	265.22	25.48	9.6%
2017	293.73	26.21	8.9%
2018	321.36	27.01	8.4%
2019	351.22	28.03	8.0%
2020	373.28	31.20	8.4%
2021	416.27	32.15	7.7%
2022	460.13	32.85	7.1%
2023	437.52	33.34	7.6%
2024	446.35	33.93	7.6%

Table 1 Total GDP of Bangladesh, Agriculture portion and share in the time span of 2015-2024

This paper's main objective is to investigate how technology, market tactics, and strategic management might be integrated within Bangladesh's agricultural economy to increase sustainability and productivity. The study looks at these interrelated variables in an effort to provide readers a thorough grasp of how they might work together to promote agricultural growth in Bangladesh. The study will specifically concentrate on the latest technical developments in the agricultural sector and how they might be used in conjunction with smart market positioning and efficient management techniques. Moreover, the study will pinpoint the distinct obstacles and possibilities linked to this integration in Bangladesh and provide practical suggestions for those involved in the nation's agriculture industry.

The continually changing agricultural environment of Bangladesh makes this study especially pertinent. Understanding how technology, market strategies, and strategic management interact is essential for Bangladeshi farmers, agribusiness owners, policymakers, and researchers to make well-informed decisions

Received: 28.02.2025 *Accepted: 14.05.2025* *Published:29.08.2025*

that improve sustainability and productivity. Adopting cutting-edge technologies that increase crop productivity and efficiency while reducing environmental effect will greatly help Bangladeshi farmers. Agribusinesses can improve product positioning, access both home and foreign markets, and boost profitability by utilizing strategic market techniques. Insights from this integration can be used by policymakers to create and carry out laws that support sustainable farming methods and guarantee Bangladesh's food security. By focusing on these critical areas, the paper aims to contribute to the broader effort of transforming Bangladesh's agricultural sector into a more productive, sustainable, and resilient pillar of the national economy.

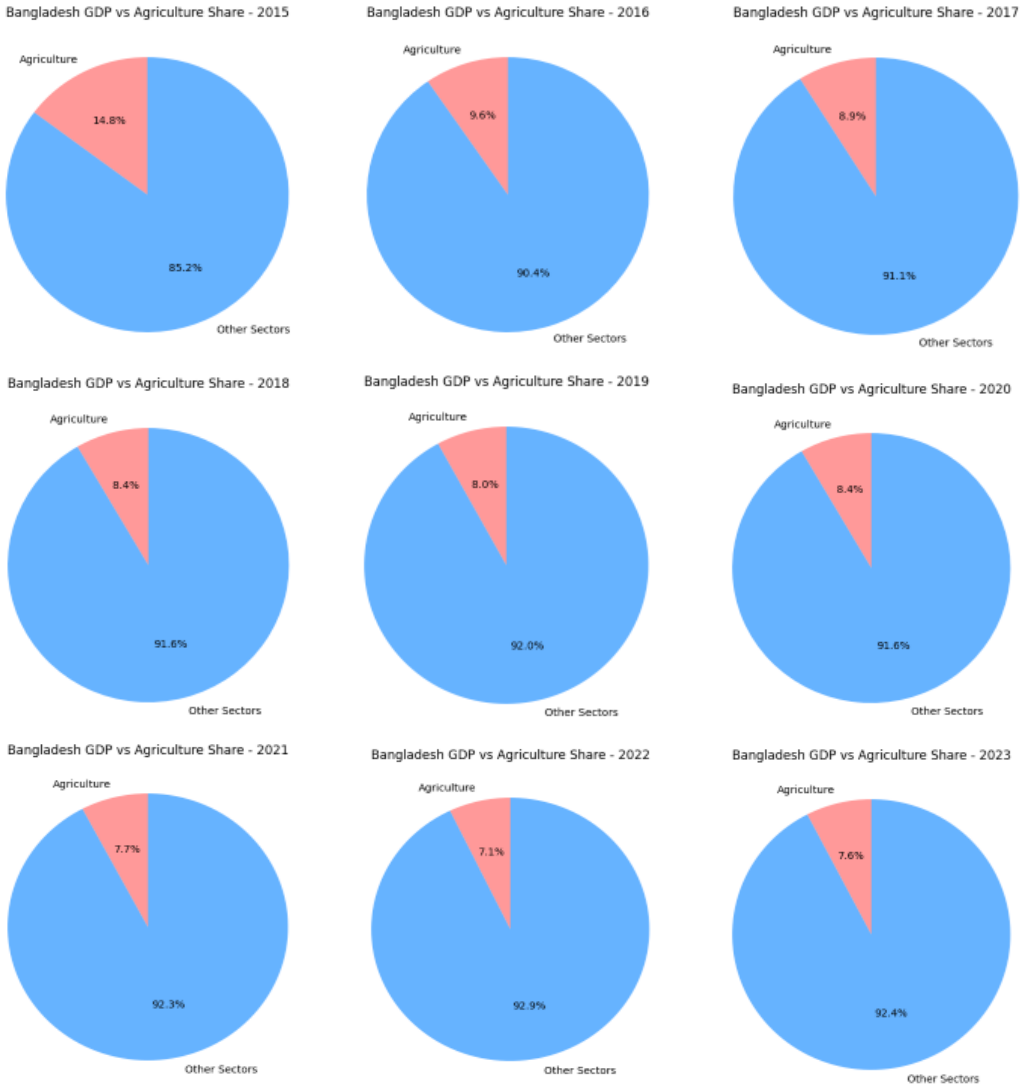


Figure 1 Share of Agriculture and other sectors in the GD

Received: 28.02.2025 Accepted: 14.05.2025 Published:29.08.2025

The main contributions of this paper are as follows:

- This study extensively explores the potential of emerging technologies such as Artificial Intelligence (AI), the Internet of Things (IoT), and biotechnology to transform the agricultural sector in Bangladesh. The research highlights how AI-driven precision farming, smart irrigation systems, and real-time disease detection can enhance resource optimization and improve crop yields, providing a sustainable solution to long-standing agricultural challenges.
- The paper includes detailed case studies to illustrate the practical application of advanced technologies. Examples include biogas production, the cultivation of salt-tolerant rice, and AI-based shrimp disease detection. These case studies underscore the potential of these technologies to address key agricultural constraints, improve environmental resilience, and promote rural economic development.
- Through regression and time series analysis, the paper demonstrates how the adoption of AI, IoT, and biotechnology can significantly improve agricultural productivity. The paper also evaluates the economic benefits for farmers, showing how technological adoption can lead to increased profitability while supporting sustainable agricultural practices.

2. ROLE OF TECHNOLOGY IN AGRICULTURE ECONOMICS

2.1 *Overview of current technologies*

Technological progress has transformed agriculture, providing groundbreaking solutions to long-standing challenges and creating opportunities for greater productivity and sustainability. For instance, Uddin et al. have found that a range of viable policy interventions, including advisory services and training organized by local development agencies such as the Department of Agricultural Extension, to enhance knowledge, create awareness, develop skills, and motivate the growers about Good Agricultural Practice (GAP) for vegetable cultivation (1). Another study indicates that the productivity of Boro rice is significantly lower in saline areas compared with non-saline areas.

Received: 28.02.2025 Accepted: 14.05.2025 Published:29.08.2025

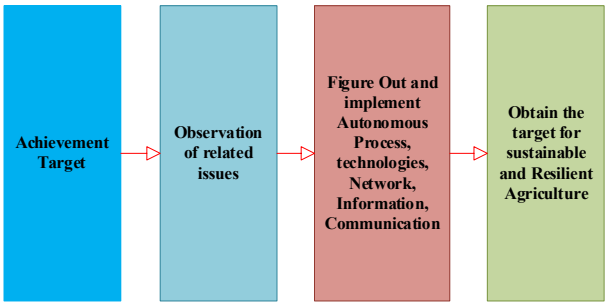


Figure 2 Technology integration process in Agriculture

The larger rice yield reduction creates a challenge for farmers to continue rice farming, with risk-taking farmers more likely to allocate their farming land to traditional rice and risk-averse farmers are more likely to allocate their land to salt-tolerant rice. Policies that promote integrated rice-fish farming and access to better salt tolerant rice varieties would be useful to address the rice yield decline in salinity affected areas (4). Then, Saha et al. found that, among the renewable energy sources, biogas from the poultry and dairy industries is an increasingly growing and promising sector, but the biogas plants operating in Bangladesh are at a loss as currently no subsidies are provided. The outcome of the SWOT analysis identified high initial investment, lack of technical knowledge, lack of local technology, poor management, and proper bio-slurry handling technology as the main barriers to disseminating biogas technology in Bangladesh (5). Then, Ahsanuzzaman et al. conducted a field study analyzing the adoption of Bt eggplant in Bangladesh and compared the results of previous RCTs. They have found that Bt eggplant raises yields, lowers total cost and pesticide costs and generates a price premium compared to non-Bt eggplant, increasing profits by 23% (6). Apart from various algorithmic technology, AI has been a game changer in Agro-economics Perspectives. Such as, robotics has been a key technology in terms of Agro-Economics perspectives of Bangladesh. For example, Bangladeshi manufacturers are beginning to explore how automation technologies can improve productivity in Figure 2, reduce errors, and ensure consistent product quality essential components for staying ahead in a fiercely competitive market. The implementation of automation in Bangladesh's apparel production is a calculated step to future-proof the sector and a reaction to competitive challenges. Emerging technologies such as automated sewing lines and robotic fabric cutting are indicating a move towards less labor-intensive and more efficient production techniques (7).

Received: 28.02.2025 Accepted: 14.05.2025 Published:29.08.2025

2.2. Impact on Economy

The economy of Bangladesh has been significantly impacted by the use of these technological developments in Bangladeshi industry and agriculture. Aside from increasing agricultural productivity, the implementation of Good Agricultural Practices (GAP) has equipped farmers with the information and abilities needed to carry out sustainable farming methods. Better crop yields and higher profitability are the outcome, which is crucial for rural communities' financial security. The advent of salt-tolerant rice varieties and the encouragement of integrated rice-fish farming have given farmers in saline-prone locations viable alternatives to traditional rice farming, thereby reducing the negative impact of salinity on rice output. By protecting farmers' livelihoods in impacted areas, these policy initiatives have improved food security and economic resilience. The growing biogas industry has a lot of promise to help Bangladesh achieve its renewable energy targets, despite present obstacles brought on by a lack of funding and technical know-how. Local economies might be stimulated by the effective adoption of biogas technology, which could lessen reliance on traditional energy sources, cut greenhouse gas emissions, and open up new business opportunities in rural areas. Bt eggplant's introduction has significantly increased yields, decreased production costs, and improved profitability, revolutionizing vegetable farming in Bangladesh. In addition to increasing farmers' incomes, this technical advancement has improved food security and decreased the need for chemical pesticides, which has benefits for the environment and public health.

Furthermore, the use of automation technology in the clothing manufacturing industry, such as automated sewing lines and robotic fabric cutting, has greatly increased output and product quality. By moving towards automation, Bangladesh is putting itself in a position to maintain its competitiveness in the global market and secure the long-term survival of its core sectors. The agricultural sector has been further strengthened by the use of deep learning technology in agriculture, such as disease identification in prawns and crops, which has enhanced disease management and resulted in better harvests and lower losses.

In order to further analyze the impact on economy, we have conducted regression and time series analysis, which is shown below:

Received: 28.02.2025 Accepted: 14.05.2025 Published:29.08.2025

2.2.1 Regression Analysis Model

Regression Analysis has been done, based on the equation below:

$$TotalGDP = \beta 0 + \beta 1 \times AgricultureGDP + \beta 2 \times ShareofAgriculture + \epsilon \quad (1)$$

Where, β0 is the intercept (constant), β1 is the coefficient for Agricultural GDP, β2 is the coefficient for the Share of Agriculture, and ϵ is the error term.

Table 2 Regression Analysis Overview

Variable	Coefficient	Std. Error	t-Statistic	p-value
Agriculture (Billion USD)	15.80555	.9492577	16.65	0.000
Share of Agriculture	-243.811	134.6034	-18.23	0.000
_cons	99.55445	34.85818	2.86	0.024

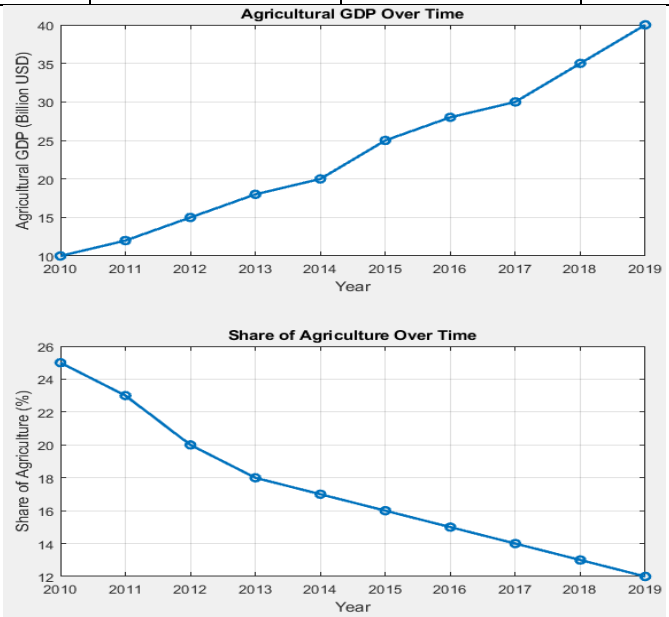


Figure 3 Relationship between Agricultural GDP and Share of Agriculture

Ten observations make up the regression analysis, according to the model summary, and the model is statistically significant based on the F-statistic of 498.16 (with a p-value of 0.0000). With an R-squared of 0.9930, the independent variables of agricultural GDP and the percentage of agriculture may account for about 99.3% of the variance in the overall GDP. The robustness of the

Received: 28.02.2025 Accepted: 14.05.2025 Published:29.08.2025

model is further shown by the corrected R-squared value of 0.9910.According to the coefficient of 15.80555, the GDP as a whole rise by roughly 15.81 billion USD for each billion USD in agriculture GDP. The substantial importance of agriculture to the total economic output is highlighted in Figure 3, by this robustly positive relationship.

The coefficient of -2453.811 indicates that the GDP as a whole fall by around 2453.81 billion USD for every percentage point increase in the agricultural sector's part of the economy. This inverse link may suggest that economies with a higher proportion of agriculture are less productive or diverse and that agriculture itself may not provide as high of a return on investment as other sectors. The constant term of 99.55445 indicates that the model projects a total GDP of roughly 99.55 billion USD if both independent variables are zero. Practically speaking, though, this is implausible as agricultural GDP and its share would normally not be zero.

2.2.2 Time Series Analysis

To comprehend how GDP and agricultural GDP have changed over time, look at their historical trends. In developing countries, a growing agricultural sector can serve as a leading predictor of general economic growth; in industrialized countries, a diminishing percentage could be a sign of economic diversification. Seasonality: Because planting and harvesting occur in cycles, agricultural output frequently displays seasonal patterns. Seasonality analysis of the time series data can shed light on the cyclical nature of agricultural output and how it affects GDP.

To capture delayed effects in time series analysis, consider lagged variables. For example, a change in agricultural output might not have an immediate impact on GDP overall; adding lagged variables could improve the model's ability to explain changes in this regard. Cointegration: As is common in the economic time series, determine whether there is a long-term equilibrium link between the agricultural variables and the overall GDP. Using an error correction model could improve comprehension of the short-run dynamics while preserving the long-run equilibrium relationship if cointegration is present.

The regression analysis highlights in Figure 4, the significance of the agricultural sector in economic growth by revealing a strong statistical link between total GDP and agricultural output. On the other hand, the adverse effect of the proportion of agriculture implies that excessive dependence on it could impede the advancement of wider economic growth. To have a greater understanding of the dynamic interaction between these variables across time, trends, seasonality,

Received: 28.02.2025 Accepted: 14.05.2025 Published:29.08.2025

and potential lag effects must all be taken into account when conducting time series analysis. Future research should focus on how shifts in agriculture production influence overall economic performance and the essential policy implications for fostering a balanced economic growth trajectory.

3. CASE STUDIES

3.1. Agricultural Biomass Based Energy

Bangladesh's fast industrialization and urbanization are driving up energy consumption. Given that 89% of its electricity comes from natural gas and only 5% comes from renewable sources, sustainable alternatives must be investigated (8). By turning crop leftovers into biogas for energy production, agricultural biomass—a valuable resource in the nation—offers a possible option. With an emphasis on anaerobic digestion (AD) technology, this study investigates the techno-economic and environmental viability of biomass-based energy generation in Bangladesh. Despite their abundance, Bangladesh frequently underutilises agricultural leftovers such maize husks, jute stalks, and rice straw. Bangladesh has the potential to produce significant amounts of renewable energy by using anaerobic digestion to turn these wastes into biogas. According to the study, the nation's agricultural leftovers could generate 1,33,815 million cubic meters of biogas each year, or 9231.60 megawatts (MW) of electricity, which would cover 88% of the nation's energy requirements. The biggest source, rice straw, provides 1,547,116.68 to 1,862,107.20 terajoules (TJ) of energy; maize and jute also have substantial energy potential. This proves that agro biomass may be a significant source of renewable energy in Bangladesh.

Received: 28.02.2025 *Accepted: 14.05.2025* *Published:29.08.2025*

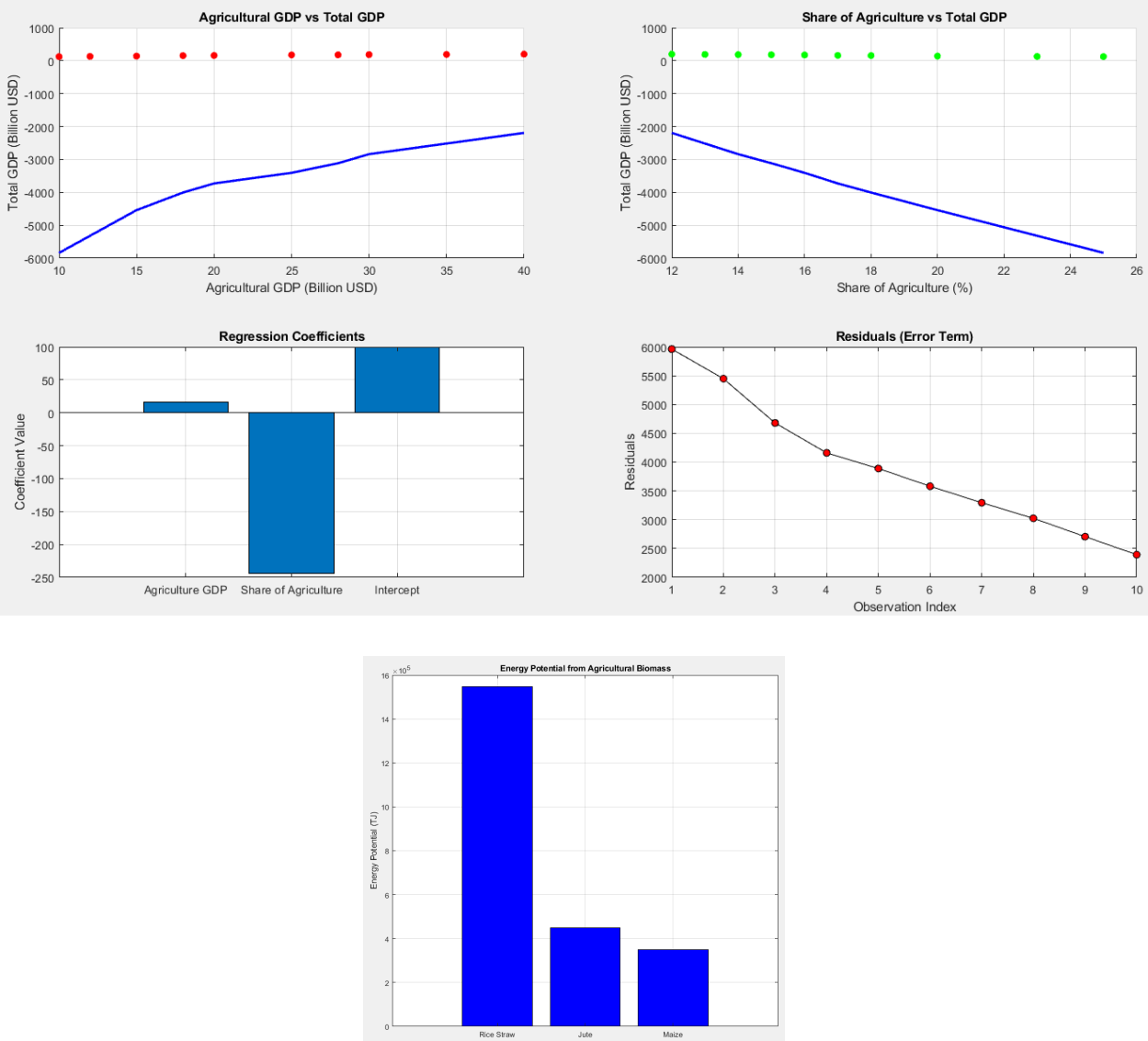


FIGURE 4 ENERGY POTENTIAL FROM AGRICULTURAL BIOMASS

The study illustrated in Figure 5 demonstrates the cost-effectiveness of biogas-based electricity generation, with a competitive levelized cost of electricity (LCoE). The advantages for the environment are also substantial. Anaerobic digestion creates biofertilizer, which enhances soil health, and lowers carbon dioxide (CO2) emissions by 156 tons per year. Biogas plants have a very short payback period (between 2.93 and 3.75 years), which makes the technology economically appealing for rural regions.

A case study was carried out in the Cumilla district's Debidwar Upazila to confirm the viability of this strategy. 82,695 families were able to get enough biogas from the anaerobic digestion

Received: 28.02.2025 *Accepted: 14.05.2025* *Published:29.08.2025*

system to suit their demands for power and cooking. The technology demonstrated the potential of agricultural biomass to supply clean, reasonably priced energy in rural Bangladesh by producing 571 MWh of electricity yearly. Bangladesh's energy problems can be sustainably resolved with the help of agricultural biomass. The nation can lessen its need on fossil fuels, cut emissions, and enhance rural energy availability by turning crop leftovers into biogas. Agricultural biomass-based energy offers Bangladesh a feasible route to a cleaner, more resilient energy future with its substantial economic and environmental advantages.

3.2. Rice Cultivation in Saline Prone Areas

Bangladesh's coastal regions are highly affected by salinity, which reduces rice productivity significantly (9). High salinity can cause significant crop failures for traditional rice types. Farmers in these regions frequently struggle with the decision of whether to switch to more hardy rice types or keep growing conventional rice. AI-guided precision farming methods have been used in some areas to address this problem. The local Department of Agricultural Extension implemented smart irrigation systems and early detection methods for soil salinity levels using data from satellite-based remote sensing and artificial intelligence (AI)-driven predictive models (10). Rice fields were equipped with Internet of Things (IoT) sensors to offer real-time information on salinity, moisture content, and soil health. When combined with AI algorithms, these devices provided farmers with personalized advice on when and how to irrigate their fields, guaranteeing the best possible growth circumstances for rice varieties that can withstand salt.

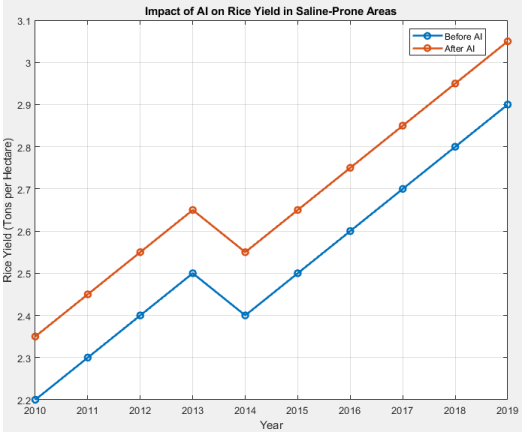


FIGURE 5 IMPACT OF AI ON RICE YIELD IN SALINE-PRONE AREAS

Received: 28.02.2025 Accepted: 14.05.2025 Published:29.08.2025

Here Figure 6 shows the impact of AI on rice yield specifically in saline prone areas. By successfully cultivating salt-tolerant rice varieties, farmers were able to lessen the negative consequences of soil salinity thanks to an AI-powered method. In addition to increasing water efficiency, the implementation of integrated rice-fish farming systems increased farmers' revenue diversification. Rice yields in saline-prone regions consequently rose by more than 15%, enhancing both food security and economic resilience. Additionally, the AI systems promoted sustainable farming methods by lowering pesticide and water waste.

3.3. Disease Detection of Shrimps

An important sector of Bangladesh's economy is the prawn farming business. However, prawn growers have suffered significant losses due to diseases like white spot syndrome. In order to identify infections, farmers frequently rely on eye observation, which may be too late for efficient action (11). AI-driven deep learning algorithms were implemented in partnership with regional research institutes to track and identify prawn diseases early. AI-powered picture recognition and underwater drones have made it possible to continuously monitor shrimp farms for signs of sickness. Technology can recognize disease symptoms like discoloration or unusual swimming patterns since it trained its algorithm on a large sample of disease photos. By detecting diseases in their early stages and enabling farmers to take prompt preventive action, the application of AI for disease detection dramatically decreased prawn death rates. Broadly speaking, farms that used this technology reported a 30% decrease in the usage of chemical treatments and a 25% rise in prawn yields (12). This not only boosted farm profitability but also improved the overall sustainability of shrimp farming by minimizing environmental impact. Also, another study conducted on, "Smart Aquaculture Analytics: Enhancing Shrimp Farming in Bangladesh through Real-Time IoT Monitoring and Predictive Machine Learning Analysis" introduces an advanced system designed to address key challenges in shrimp farming by integrating Internet of Things (IoT) technologies and machine learning (ML) (11).

Received: 28.02.2025 Accepted: 14.05.2025 Published:29.08.2025

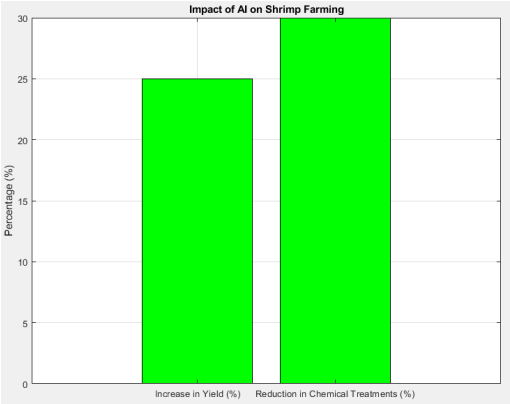


FIGURE 6 IMPACT ON SHRIMP FARMING

The study emphasizes that shrimp farming, a vital economic sector in Bangladesh, faces issues such as environmental degradation and poor water quality, leading to reduced shrimp production. To combat this, the proposed system employs real-time monitoring of critical water parameters—pH, temperature, salinity, electrical conductivity, and total dissolved solids (TDS)—using sensors and microcontroller-based devices. The data is processed through predictive ML models, offering farmers forecasts of water quality and shrimp production levels. Through Figure 7, it is clear this system significantly improves traditional manual monitoring by providing automation and real-time feedback, which helps farmers take proactive measures. It integrates multiple linear regression for predictive analysis and various classification algorithms (e.g., Random Forest, Logistic Regression) to forecast shrimp production. The system ensures ideal circumstances for prawn growth by delivering alarms using a web-based application and smartphone notifications, with a high success rate (97.84% accuracy by Random Forest). According to the findings, this Internet of Things-based strategy can increase prawn yield, lower production costs, and support sustainable aquaculture methods. The report does, however, recognize several issues that must be resolved for broader use, such as startup costs, scalability, and data gaps brought on by network instability. However, the creative application of technology promises to revolutionize Bangladesh's prawn farming sector, guaranteeing both financial and ecological gains. This all-inclusive solution is a major step towards more intelligent, sustainable aquaculture since it not only increases production efficiency but also gives farmers useful insights.

Received: 28.02.2025 Accepted: 14.05.2025 Published:29.08.2025

3.4. Robotic Automation in Dairy Industry

Bangladesh's dairy business confronts a number of difficulties, such as low production, ineffective large-scale farm management, and restricted access to contemporary technologies. Manual labor-intensive chores are a common problem for small-scale dairy farmers, which restricts their capacity to increase output and sustain profitability (13). Larger dairy farms in the northern provinces of Bangladesh were equipped with robotic milking systems in order to overcome these difficulties. The milking process was automated using AI-powered milking robots that included sensors. These systems keep track of each cow's health and milk production in addition to managing milking. Artificial intelligence (AI) systems examine data from every milking session to spot patterns, identify diseases, and adjust feeding regimens for increased milk production (14). Due to farmers' enhanced efficiency and regularity in milking cows, the dairy industry saw a 20% rise in milk production once robotic automation was implemented. By enhancing herd management and offering early indications of health problems, automated monitoring also lessens disease outbreaks. In addition to lowering labor expenses, this technical advancement enabled farms to expand while maintaining a constant level of milk quality (15). The success of these farms shown in Figure 8, has encouraged other large dairy producers in Bangladesh to adopt similar AI and robotic technologies.

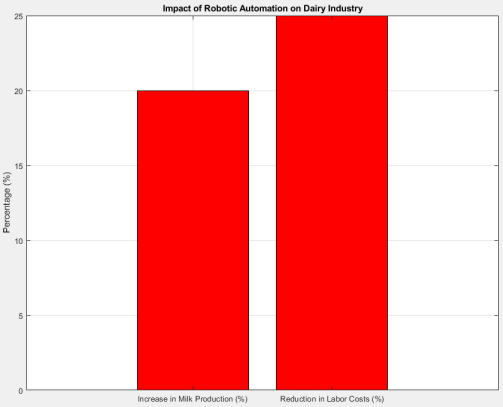


FIGURE 7 IMPACT OF AUTOMATION IN DAIRY INDUSTRY

Received: 28.02.2025 Accepted: 14.05.2025 Published:29.08.2025

4. FUTURE DIRECTIONS ON STRATEGIC PLAN

A revolutionary route to sustainable growth is provided by the incorporation of digital advances, as Bangladesh's agriculture sector faces difficulties ranging from climate change to rising food demand. Digital tools have greatly increased agricultural productivity and resilience, as seen by global trends (16), Bangladesh is on the verge of a revolution in agriculture. The nation needs adopt cutting-edge technology like blockchain, artificial intelligence (AI), precision farming, and the Internet of Things (IoT) in order to realize this potential. In addition to increasing production, these developments will guarantee that farming methods are resilient and sustainable in the face of economic and environmental difficulties.

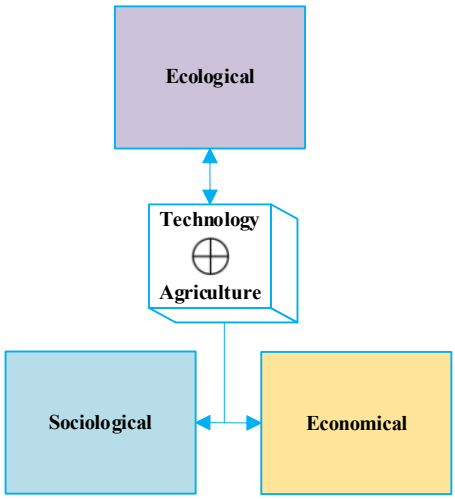


FIGURE 8 OBTAINABLE DIMENSIONS OF TECHNOLOGY INTEGRATION INTO AGRICULTURE.

In agriculture, the combination of market tactics, technology, and strategic management produces deep synergies that greatly increase sustainability and productivity throughout the value chain (17). Technology operates as a pivotal enabler, Figure 8 driving innovation within both market strategies and strategic management frameworks. On the other hand, technological developments are smoothly incorporated with market demands and in line with the overall goals of the organization when strategic management is done well. Advanced technologies like drones, biotechnology, IoT, artificial intelligence, and precision agriculture provide vital data and insights that support well-informed strategic decision-making in the agricultural industry. Precision farming technology, for example, enables farmers to allocate resources optimally based on real-time information, increasing operating efficiency and reducing expenses. Conversely, AI-powered

Received: 28.02.2025 Accepted: 14.05.2025 Published:29.08.2025

prediction models provide profound understanding of consumer behavior and market dynamics, enabling agribusinesses to improve their marketing tactics, proactively address changing consumer preferences, and ultimately maximize profitability (18).

By integrating technical breakthroughs into comprehensive strategies, strategic management frameworks could help Bangladeshi agricultural firms take advantage of these developments. Adoption of technology is matched with long-term national objectives through strategic planning, which aids in spotting chances for innovation and giving the agriculture industry a competitive edge. In order to provide a seamless integration that promotes sustainable growth, effective management also handles potential risks related to the implementation of new technology, such as worries about data security or operational difficulties. Furthermore, market strategies make use of these technical developments to enhance client involvement, distribution networks, and product positioning (19). In highly competitive markets, agricultural firms in Bangladesh are able to differentiate their products and increase their value through strategic market positioning that is informed by technology insights.

Adopting digital technologies that optimize resource utilization and enhance farming decision-making is one of Bangladesh's main objectives in terms of future orientation to realize its full potential. With the use of technologies like precision agriculture, which makes use of data from sensors, satellites, and drones, farmers can adjust the amount of water, fertilizer, and pesticide they use to meet the unique requirements of their crops. Precision agriculture may increase output while minimizing environmental damage in a nation like Bangladesh, where farming is mostly dependent on periodic rains and effective resource management is essential. These technologies assist farmers in making well-informed decisions on the timing and application of resources, hence decreasing waste and expenses, by facilitating data-driven decision-making (20). Furthermore, using digital tools into Bangladesh's agricultural industry helps promote environmentally friendly farming methods. Deforestation and soil degradation are two major environmental issues facing the nation that endanger long-term agricultural productivity. Bangladesh can transition to greener practices by implementing AI-powered robotics and self-sufficient agricultural systems. For example, AI systems may track crop health in real time, allowing for prompt interventions that minimize harm and maximize output, while autonomous weeding robots can lessen the need for chemical pesticides (21). In addition to reducing environmental damage, this move towards digital farming will increase Bangladesh's agricultural systems' ability to withstand climatic fluctuations.

Received: 28.02.2025 Accepted: 14.05.2025 Published:29.08.2025

Enhancing market accessibility for Bangladeshi farmers is another crucial area where digitalization can have a significant influence. The supply chain's lack of traceability and transparency now makes it difficult for many smallholder farmers to reach international markets. However, Bangladesh's agricultural products can more easily reach consumers abroad with the use of digital marketing platforms and blockchain technology. Customers can track the origin of agricultural products thanks to blockchain, which in particular guarantees transparency in the production and distribution process. This boosts customer confidence and demand for Bangladeshi commodities. Furthermore, producers may charge greater prices for their products by connecting with consumers directly through digital channels, eliminating the need for middlemen (22).

Another urgent issue facing Bangladesh's agriculture industry is climate change adaptation, and digital technology can be extremely helpful in boosting resilience. The nation is extremely susceptible to climate-related hazards, like droughts and floods, which jeopardize agricultural output (23). Farmers can obtain early warnings of extreme weather events and modify their farming techniques accordingly by implementing remote sensing technologies and AI-based predictive models. For instance, farmers can use predictive analytics to determine when to water to lessen the effects of drought or when to plant crops to prevent floods. Furthermore, localized digital insurance systems can offer smallholder farmers protection against climate-related losses, boosting their financial stability and facilitating a speedier recovery from unfavorable occurrences (24).

Bangladesh must also address the issue of the digital divide in order to guarantee that the advantages of digital agriculture are widely available. The bulk of agricultural workers are smallholder farmers, who frequently lack the funds to purchase pricey technology gear. Because large-scale farmers are more likely to profit from technical developments, there is a risk that inequality within the sector will increase. Bangladesh may address this issue by promoting cooperative investment models and shared technology platforms that provide small farmers with cheaper access to digital tools (25). One way to guarantee that smallholder farmers profit from these advancements is through farm machinery cooperatives, in which farmers pool their resources to purchase digital tools and equipment. Many European nations have successfully adopted this concept, lowering the cost of digital agricultural instruments for small-scale farmers through the use of shared technology platforms (26).

Received: 28.02.2025 Accepted: 14.05.2025 Published:29.08.2025

Furthermore, incorporating digital innovations that improve resilience, sustainability, and productivity is crucial to Bangladesh's agro-economic future. Bangladesh can tackle the urgent issues of resource management, environmental degradation, and climate change by implementing technologies like blockchain, AI, digital insurance, and precision farming. Furthermore, bridging the digital divide and fostering equitable growth in the agriculture industry will be made possible by guaranteeing smallholder farmers' access to these advances via cooperative structures and shared platforms. These digital technologies will be crucial in helping Bangladesh develop a more resilient and sustainable agricultural sector in the future.

5. CONCLUSION

The ability of Bangladesh's agricultural sector to adopt and incorporate digital breakthroughs like AI, IoT, and precision farming will determine its future. In addition to optimizing resource management, these technologies guarantee resilience against economic and environmental stresses. Despite the challenges that the shift to digital farming presents, especially for smallholder farmers, there is no denying the advantages in terms of efficiency, sustainability, and market accessibility. Bangladesh can greatly increase food security, lessen the effects of climate change, and increase agricultural output by utilizing these technologies. Policymakers, agribusinesses, and farmers must work together to close the digital divide, promote cooperative investment models, and put long-term growth-ensuring tactics into place if these technologies are to be successfully adopted. In the end, safeguarding Bangladesh's future as a robust and successful agricultural economy would depend heavily on the incorporation of cutting-edge technologies into agricultural operations.

REFERENCES

1. Uddin MN, Akter S, Roy D, Dev DS, Mithun MNAS, Rahman S, et al. An econometric analysis of factors affecting vegetable growers' interest in good agricultural practices: a case of rural Bangladesh. Environment, Development and Sustainability. 2024:1-21.
2. Koutridi E, Christopoulou O. “The importance of integrating Smart Farming Technologies into Rural Policies (Aiming at sustainable rural development)- Stakeholders’ views”. Smart Agricultural Technology. 2023;4:100206.
3. Čop T, Njavro M. Nudge research in agricultural economics: two-decade retrospective of empirical evidence. China Agricultural Economic Review. 2024.

Received: 28.02.2025 Accepted: 14.05.2025 Published:29.08.2025

4. Sarker J. An Economic Analysis of the Impact of Practicing Climate Smart Agriculture by Rice Producers in Bangladesh: CQUniversity; 2024.
5. Saha CK, Nandi R, Rahman MA, Alam MM, Møller HB. Biogas technology in commercial poultry and dairy farms of Bangladesh: present scenario and future prospect. Biomass Conversion and Biorefinery. 2024;14(7):8407-18.
6. Ahsanuzzaman, Husain H, Zilberman D. Complementarity of field studies and RCTs: evidence from Bt eggplant in Bangladesh. European Review of Agricultural Economics. 2024;51(2):221-47.
7. Al Bashar M, Taher MA, Islam MK, Ahmed H. The Impact Of Advanced Robotics And Automation On Supply Chain Efficiency In Industrial Manufacturing: A Comparative Analysis Between The Us And Bangladesh. Global Mainstream Journal of Business, Economics, Development & Project Management. 2024;3(03):28-41.
8. Akter MM, Surovy IZ, Sultana N, Faruk MO, Gilroyed BH, Tijing L, et al. Techno-economics and environmental sustainability of agricultural biomass-based energy potential. Applied Energy. 2024;359:122662.
9. Lam Y, Winch PJ, Nizame FA, Broaddus-Shea ET, Harun MGD, Surkan PJ. Salinity and food security in southwest coastal Bangladesh: impacts on household food production and strategies for adaptation. Food Security. 2022;14(1):229-48.
10. Mana AA, Allouhi A, Hamrani A, Rehman S, el Jamaoui I, Jayachandran K. Sustainable AI-based production agriculture: Exploring AI applications and implications in agricultural practices. Smart Agricultural Technology. 2024;7:100416.
11. Ahmed F, Bijoy MHI, Hemal HR, Noori SRH. Smart aquaculture analytics: Enhancing shrimp farming in Bangladesh through real-time IoT monitoring and predictive machine learning analysis. Heliyon. 2024;10(17):e37330.
12. Verdegem M, Buschmann AH, Latt UW, Dalsgaard AJT, Lovatelli A. The contribution of aquaculture systems to global aquaculture production. Journal of the World Aquaculture Society. 2023;54(2):206-50.
13. Islam F. Challenges of Dairy industry in Bangladesh: The Daily Observer; 2023
14. Bhoj S, Tarafdar A, Singh M, Gaur GK. Smart and Automatic Milking Systems: Benefits and Prospects. In: Sehgal S, Singh B, Sharma V, editors. Smart and Sustainable Food Technologies. Singapore: Springer Nature Singapore; 2022. p. 87-121.
15. Chowhan S, Rahman MM, Sultana R, Rouf MA, Islam M, Jannat SA. Agriculture Policy and Major Areas for Research and Development in Bangladesh. Sarhad Journal of Agriculture. 2024;40(3):245-51.
16. Abiri R, Rizan N, Balasundram SK, Shahbazi AB, Abdul-Hamid H. Application of digital technologies for ensuring agricultural productivity. Heliyon. 2023;9(12):e22601.
17. Zul Azlan ZH, Junaini SN, Bolhassan NA, Wahi R, Arip MA. Harvesting a sustainable future: An overview of smart agriculture's role in social, economic, and environmental sustainability. Journal of Cleaner Production. 2024;434:140338.
18. Sivarajah U, Kumar S, Kumar V, Chatterjee S, Li J. A study on big data analytics and innovation: From technological and business cycle perspectives. Technological Forecasting and Social Change. 2024;202:123328.
19. Sharma V, Tripathi AK, Mittal H. Technological revolutions in smart farming: Current trends, challenges & future directions. Computers and Electronics in Agriculture. 2022;201:107217.

Received: 28.02.2025 Accepted: 14.05.2025 Published:29.08.2025

20. Mondejar ME, Avtar R, Diaz HLB, Dubey RK, Esteban J, Gómez-Morales A, et al. Digitalization to achieve sustainable development goals: Steps towards a Smart Green Planet. Science of The Total Environment. 2021;794:148539.
21. Konfo TRC, Djouhou FMC, Hounhouigan MH, Dahouenon-Ahoussi E, Avlessi F, Sohounhloue CKD. Recent advances in the use of digital technologies in agri-food processing: A short review. Applied Food Research. 2023;3(2):100329.
22. Pascucci F, Savelli E, Gistri G. How digital technologies reshape marketing: evidence from a qualitative investigation. Italian Journal of Marketing. 2023;2023(1):27-58.
23. Chowdhury MA, Hasan MK, Islam SLU. Climate change adaptation in Bangladesh: Current practices, challenges and the way forward. The Journal of Climate Change and Health. 2022;6:100108.
24. Kumar R, Farooq M, Qureshi M. Chapter 10 - Advancing precision agriculture through artificial intelligence: Exploring the future of cultivation. In: Hamadani A, Ganai NA, Hamadani H, Bashir J, editors. A Biologists Guide to Artificial Intelligence: Academic Press; 2024. p. 151-65.
25. Gumbi N, Gumbi L, Twinomurinzi H. Towards Sustainable Digital Agriculture for Smallholder Farmers: A Systematic Literature Review. Sustainability [Internet]. 2023; 15(16).
26. Gaffney J, Challender M, Califf K, Harden K. Building bridges between agribusiness innovation and smallholder farmers: A review. Global Food Security. 2019;20:60-5.

DISCLOSURE OF CONFLICT

The author(s) declare that they have no conflicts of interest.

FORCE: Focus on Research in Contemporary Economics *2025 - Vol:6 No:1*

Received: 16.03.2025 *Accepted: 24.05.2025* *Published:29.08.2025*

FOREIGN AID AND ECONOMIC DEVELOPMENT: ASSESSING WHETHER INTERNATIONAL FINANCIAL ASSISTANCE PROMOTES SELF-SUSTAINABILITY OR CREATES DEPENDENCY

Javed Khan - University of Peshawar, Pakistan

Email: javedkhan2024@uop.edu.pk

ORCID

Abstract

This paper investigates the interaction between foreign aid and economic growth to determine whether financial support from international organizations promotes self-sufficiency or places a country on the dependent and unsustainable path. The research analysis is therefore based on the theoretical and empirical analysis conducted on the history of aid including post world war II Marshall plan and the current aid types in the developing economic region. Analytics based on econometric regression analysis have been made accompanied by comparative case-studies of the countries which have already moved beyond the tendency of aid-dependency or those still remaining to be fully dependent on external funding. Available research shows that aid does work depending on the quality of governance, institutions, as well as the quality of implemented policies. While countries like South Korea and Rwanda have used aid for more industrialization and long run economic development, Haiti, DRC has just lived in the loop of aid dependency due to bad governance structures and institutions. This review also focuses on issues like fungibility of aid, Dutch disease effects, conditionality and its effect on aid amongst others, therefore recognising the need for aid restructuring or reformation. Through examining the effects of aid on economic growth and growth in governance decade and economic diversification this paper seeks to make a contribution to the ongoing discussions towards understanding how aid should be restructured in order to foster and support sustainable development. It has implications for policy makers, development agencies, and the multilateral development banks, and underscores the necessity for leveraging foreign aid with policy reforms, better governance, investment in human capital, and pathways away from dependence on aid.

Keywords: Foreign Aid, World War II, Sustainable development, aid-dependency

Received: 16.03.2025 Accepted: 24.05.2025 Published:29.08.2025

1. INTRODUCTION

Aid has become one of the cornerstones of international economic relations with different goals of development, poverty alleviation, and stability in the recipients' nations. It has been in the form of bilateral and multilateral financial aid, humanitarian aid and technical assistance. Foreign aid and its contribution towards economic development have been matters that have been widely discussed within theory and practice. Some scholars have posited that while foreign aid assists nations in achieving capacity to strive for sustainable development by funding the infrastructural, health, and educational sectors, it hampers autonomy, discourages domestic revenue mobilization, and elongates the reliance on donor's support (Easterly, 2006 Moyo, 2009). The impact of aid also depends on such related factors as Governance Quality, Institutional Capacity, Aid Allocation and Utilization (Burnside & Dollar, 2000).

Foreign aid has been in existence from the period immediately after the Second World War when the Marshall plan was initiated to restore the economy of the affected regions in Europe. This proved that when the circumstances were right, external funding could help achieve enduring economic sustainability. The Marshall plan ensured that the European nations developed a sustainable economy while undergoing a structural change which means that aid helps in the structural transformation of the economy. Thus, with respect to the developing countries, foreign aid has been rather ambiguous. There are examples of how some nations like South Korea and Taiwan for instance, have managed to use aid to foster industrialization and, thus, economic independence, as postulated by Amsden in 1989. However, most countries in Sub-Saharan Africa have remained a subject to donors' aid for many years and this has served as a major concern due to aid- dependency rather than aid-induced self-supporting economy (Collier, 2007).

The Modernization Theory avers that aid is a prerequisite for growth, particularly in a country that does not have the capital base and resources for the attainment of industrialization (Rostow, 1960). In this perspective, aid is seen to offer initial capital outlay in infrastructure, education, and health, on which long-term growth is anchored. Hall (1998) argues that this perspective is correct arguing that aid has a positive impact on economic development where it is accompanied with good macroeconomic policies and governance (Sachs 2005). However, critics still say that in many ways aid has remained ineffective, especially in realizing sustainable development because of

Received: 16.03.2025 Accepted: 24.05.2025 Published:29.08.2025

issues to do with governance, corruption and inefficiency in the utilization of the funds (Easterly, 2006).

On the other hand, there is the stand of the Dependency Theory that does not support the belief that foreign aid is good for developing nations. According to this theory, aid distorts local production, discourages the Djiboutian government from seeking domestic revenue, and makes the country become a beggar economy (Frank, 1967). Some research has established that where aid is sufficiently large it discourages the reform efforts of a government or improvement of a country's production capacities (Brautigam & Knack, 2004). Additionally, according to literature, there is hardly any economic growth in the aid-dependent economy, and the government loses its interest in self-reliant economic policies (Djankov, Montalvo, & Reynal-Querol, 2008).

The findings about causality between foreign aid and economic development are still limited and inconclusive. Burnside and Dollar (2000) established that foreign aid leads to an increase in economic growth of a given country and especially when such assistance is given to countries with an effective policy environment. The authors who undertook this study argued that aid works in cases where the recipient government implements structural policies such as stability, investment and liberalization policies. In contrast, a re-assessment by Easterly, Levine, and Roodman (2004) noted that there is no correlation between aid and economic growth since bad policies such as poor governance and corruption offset the effects of aid.

For instance, South Korea utilized foreign aid in funding industrialization and acquisition of technology for development, with a view of attaining long term financial independence (Cheng, 1990). The government advocated for exportation, the growth of private sector, and innovations, which saw the country shift from being a tandem economy to a world economy giant in a record time according to Kim (1997). On the other hand, Haiti gives some instances where aid has not played its role in the development of nations. Despite the assistance that has been received for several decades, Haiti continues to face poverty bearing in mind that it has one of the weakest institutional frameworks, instabilities politically and undue dependence of foreign aids (Dupuy, 2010).

The effectiveness of foreign aid therefore depends on the categories of aid being deployed. Humanitarian aid that is given after calamities such as natural disasters or war has indeed played

Received: 16.03.2025 Accepted: 24.05.2025 Published:29.08.2025

an important role in offering basic needs and easing the sufferings of affected people (Clemens et al., 2004). Nonetheless, the development aid that is expected to promote sustained economic growth was criticized for fostering institutionalized dependency as opposed to economic liberalization (Riddell, 2007). A number of theoretical works indicate that effectiveness of aid process depends on governance structures and other related economic policies and absorptive capacity of the aid integrated into other development frameworks (Acemoglu & Robinson, 2012).

However, the contending challenges have not in any way minimized the importance of foreign aid in containing inequalities and enhancing economic growth in the world today. Different global entities like the World Bank, IMF and the United Nations, for instance, still Richard A. Cannon, Jeremy Stringer and Andre Spicer (2010) put much premium on the role of aid in attaining the sustainable development goals. Still, it is generally recognized that aid has to be combined with structural changes, better governance, and effective economic development strategies for sustainable development to take place (Williamson, 2000).

This research aims at assessing the level to which foreign aid enhances economic self-sustainability or leads to dependency. Therefore, the purpose of this paper is to develop a critical evaluation of conditions that enable foreign aid to enhance the achievement of sustainable development goals. This research will assist policymakers in the development of aid programs that embrace both short-term relief and sustainable economic standing in the longer term.

2. LITERATURE REVIEW

The shortcomings of foreign aid for economic development has been an issue of significant discussion in economic and policy literature. The literature on the subject of the role of aid in helping people to become permanently self-reliant or perpetuating their dependency gives mixed results. Theoretically, qualitatively, and quantitatively, numerous models, factors and cases have endeavoured to capture the nature of foreign aid and its impact on recipient countries.

Foreign aid can be said to have originated from the concept of post-World War II reconstruction through signifiers such as the Marshall Plan that sought to rebuild Western Europe's economy. Helmut and Rainer (2012) attributed effectiveness in the Marshall Plan saying that the program succeeded because it had clear policies, good governance and that recipient nations were willing to embark on economic reforms. On the same note, critics or rather scholars such as Boone

Received: 16.03.2025 Accepted: 24.05.2025 Published:29.08.2025

(1996) argue that while aid in Europe led to a quicker economic recovery through the Marshall Plan, the same has not been witnessed in developing countries hence the weaker institutions and governance structures.

The studies have affirmed that governance and institutions are critical for the achievement of foreign aid goals. According to Knack and Keefer (1995), in most of the corrupt nations, foreign aid does not deliver the planned goals because it is mostly misused, and resources are not effectively utilized. Svensson (2000) also concurs with this claim stating that corruption in countries that receive aid rises when there are no accountability procedures in place. Also, Alesina and Weder (2002) have noted that even today donors continue to fund corrupt regimes indicating that as much as 80 per cent of donor funding is channeled to dictatorial regimes that always misuse the resources. On the other hand, Kosack (2003) indicated that while supporting his argument by research findings, aid has a positive impact on human development in education and health sectors for the democratic and transparent regimes.

Various studies have used cross-section regression analysis in an effort to relate foreign aid to economic growth. Rajan & Subramanian argued that aid has no significant positive effect on the growth of GDP and further contended that aid distorts the market structure by favoring foreign producers over local producers. These findings contrast with prior studies by Hansen and Tarp (2001) examining the relationship between aid inflows and economic growth, showing that aid has had a positive impact on the growth rate provided the capital is directed to productive investment rather than consumption expenditure. Clemens et al (2012) also establish that short-term aid in infrastructure as well as technical cooperation seems to have pushed growth because long-term development aid is not as evident to have had affected the development because of structural revelations in the recipients' economy.

Foreign aid, according to Dependency theory which originated from Prebisch (1950) and expounded by Dosman (2008), sustains negative outcomes since it prolongs the duration that a country depends on foreign aid. In this context, Long argues that aid negates development by immobilising the developing nations in underdevelopment whereby aid disincentivises domestic production whilst encouraging dependency on donor agencies. Ghosh and Kharas (2011) offset this by explaining that most African countries that receive large amounts of aid have not demonstrated much progress towards their economic sustainability. Critics state that aid makes

Received: 16.03.2025 Accepted: 24.05.2025 Published:29.08.2025

donors addicted to receiving money and discourages them from making appropriate economic changes or improving their countries' efficiency in collecting taxes.

However, the advocates of foreign aid as a means of development say that in the right form it remains a beneficial tool for development. Sachs and Warner (1997) echo this view, arguing that aid is necessary for escape from poverty traps especially for the LICs that suffer from weak initial stocks of infrastructure. According to them, education, health, and rural development aid enhances the human capital hence creating long term economic sustainability. Similarly, Mishra and Newhouse (2009) go further to offer some proof that aid to the health sector indeed lowers child mortality and boosts total health of people.

One major methodological difficulty when evaluating the effects of aid is fungibility, for example aid committed for development purposes is often used to fund other expenditures that may include military budget or other non-development government expenditure. As Feyzioglu, Swaroop, and Zhu (1998) show, in many recipients, foreign aid does not lead to increased public spending of health and education because the governments use aid to replace domestic resources. Likewise, Remmer (2004) observes that while high aid inflows have positive effects, they lead to poor tax efforts by the government thus depending on external support and not mobilizing domestic resources.

Research on the Dutch Disease effect also reveals other undesired impacts of a huge flow of aids. Torvik (2001) pointed out that the negative effect of foreign aid includes interaction with the real exchange rate vulnerability to appreciate thereby making the home country industries become high priced compared to their counterparts in the international market. Some studies including Arellano, Bulír, Lane, and Lipschitz (2009) also affirm this claim arguing that aid-prone economies are usually characterized by a number of macroeconomic vices such as inflation and loss of export competitiveness.

Several studies involving actual cases further elucidate the challenges of aid efficiency. Some empirical findings from other studies include; Dercon and Krishnan (2000) for Ethiopia, examine the impact of aid-funded agricultural development interventions and conclude that it has brought about an increased food security and improvement of the well-being of most Ethiopians living in the rural areas. On the other hand, Farmer (2003) profile on Haiti has revealed that despite having received aid for many years, this has not brought about any change on the economic status due to political instabilities and institutions. Likewise, Killick (1997) points out that many African

Received: 16.03.2025 Accepted: 24.05.2025 Published:29.08.2025

countries that receive a great deal of aid have actually not been able to become fully sustaining, a result of poor policies and absent infrastructures.

However, another significant factor associated with the aids-development nexus is in the form of aid conditionalities. Bilateral and multilateral donors like the IMF and the World Bank frequently attach economic and political conditionalities to their aid. This work shall present an analysis of this particular kind of foreign aid as also established by Mosley, Hudson, and Verschoor in their work of the same al entitled 'Aid, Policies and Growth.' Dijkstra (2002) also noted that the use of conditionality will at times work to the detriment if countries do not regard their receiving country's capacity to finance projects and other social needs.

It can thus be seen that even after many years of research the issue with regard to the use of foreign aid remains open ended. While some writers have argued that aid has the potential of bringing out the spirit of growth as well as better quality of lives others have opined that aid has the potential of coming with negative effects and some of them are dependency and formation of lowest status in the international market. Thus, the evidence in the literature points to the fact that aid effectiveness is contingent on a number of factors, specifically governance quality, institutional capacity and strategy in the distribution of funds. Therefore, there is need to have further research on how aid can be channeled in a way that will help bring the intended positive change along with reducing the dependence effect.

3. METHODOLOGY

The present research aims to investigate whether foreign aid enhances self-sustainability or perpetuates a culture of dependency in the target countries; thus, employing both qualitative and quantitative research as the primary forms of data collection and analysis. This paper will employ a method called mixed research to assess the impact of foreign aid on economic development due to its ability to combine quantitative and qualitative data.

Research Design

Consequently, the whole process of the present study applies a mixed-methods design, which combines quantitative and qualitative data analysis. The quantitative component includes related analyses of economic growth coefficients, levels of aid flow, and governance variables, while the qualitative component entails descriptions of the cases of countries that are either effective in using

Received: 16.03.2025 Accepted: 24.05.2025 Published:29.08.2025

aid for development purposes or have become dependent on it. This approach allows for a more comprehensive view of the aid–development relationship by considering both long-run economic structures and characteristics of the aid and development processes.

Data Collection Methods

This study will use secondary sources of information and policy review to assess the nexus between foreign aid and economic development. The International sources used to gather quantitative data include the World Bank, the International Monetary Fund and the United Nations Development Programme, as well as the Organization for Economic Cooperation and Development. Human development indices Human development index, FDI inflow, economic growth in form of DPR, and the corruption indices from Transparency International are also used to measure economic progress in the aid-recipient countries. The time frame for data collection ranged from 1990 to 2023 thus providing both the short-run and the long-run changes in experiments due to the aid funding of the countries.

Besides the quantitative economic data, the qualitative data includes the content analysis of policy reports, donor agency guidelines and case studies. The paper analyzes the government policies of the countries receiving the aid and dissects whether these policies were changed due to the conditions attached to the aid and whether the change was real and sufficient for real improvement. Information used in this study is collected from international development reports, academic publications in the area of economics, government documents and records of aid-funded initiatives.

Analytical Framework

Based on the above framework, this paper uses econometric regression analysis models to carry out analysis on the effect of foreign aids on the economy. The cross sectional regression analysis that is employed in this study seeks to establish the relationship between the level of aid and GDP growth controlling for other factors like governance quality, economic policy and corruption. In order to check the strength of the result, both the fixed and random effects models are run to check the generalizability of the finding that aid has negative effect in different countries. This makes it possible to check whether aid always has a positive impact on the economic growth of a country or whether its impact is influenced by the governance and institutions of a country. Additionally,

Received: 16.03.2025 Accepted: 24.05.2025 Published:29.08.2025

the granger causality tests are used to establish directly whether the aid triggers the growth of the economy or the growth of the economy leads to the increase in aid. This differentiation is useful when in the discussion between those two positions – as the proponents of the former argue aid contributes to developing countries' development, while the supporters of the latter claim aid merely responds to the conditions in the recipient countries. Concerning endogeneity and reverse causality issues, other statistical tools like Instrumental Variable (IV) have been employed to examine the relationship between aid and economic performance.

The methods adopted for the qualitative study involve the use of comparative case study approach that is utilised to compare the efficacy of aid in different geographical and political settings. The countries that have successfully moved from the phase of aid, for instance South Korea, Rwanda, Ghana, and Ethiopia are contrasted with countries like Haiti, Democratic Republic of Congo and Afghanistan where there is a problem with aid dependency. As a research methodology, the case study enables exploration of the effects that policies, institutional frameworks, and economic models of fund disbursement have on foreign aid programs.

Ethical Considerations

This work follows the standards of ethical research by ensuring the use of valid data sources and citing authority references accordingly. There are no persons of interest in this type of research because, as it has been highlighted, this study uses secondary source data, thus little issues of ethics in data collection arise. However, in presenting economic and policy reports, bias is not encouraged as it predisposes the presentation of the findings. The study also demonstrates methodological rigor in terms of providing easy-to-understand documentation about the sources of data, approaches to econometric modeling, and the criteria for selecting cases in an effort to minimize issues with replicability.

Limitations of the Study

Despite the merit of the mixed-methods approach in the evaluation of foreign aid effectiveness, the following limitations must, however, be recognized. One major challenge is the distinctiveness of the aid typology since foreign aid is not homogenous rather it has different kinds of characteristics such as its ends, its mold and the ways it is channeled to a country. Some of the aid is of an emergency relief and humanitarian nature while the other aid is programmed for long term

Received: 16.03.2025 Accepted: 24.05.2025 Published:29.08.2025

economic development. This causes a problem when implementing these two clusters in an attempt to evaluate the overall extent to which aid impedes self-sustainability.

One of them is the problem of separating the impact of foreign aid on the growth and development process from the effects of other antecedent economic and political factors. Developing countries face volatility in economic growth and development due to factors such as fluctuations in the prices, leadership crisis, and financial crisis. This makes it very difficult to associate the development results with the foreign aid on the basis of the above variables. To tackle this, the study includes control variables and robust tests in the analysis to eliminate the external factors. However, there are concerns about data reliability, especially as some of the countries in the developing world may not have robust official institutions with a good record of producing quality economic data. This is compounded by the fact that the donor agencies do not report their aids in a consistent manner. To overcome such problems, data collected from different international organizations are cross-checked to check the authenticity of the data collected.

4. RESULTS

A The findings of this study help to establish a comprehensive understanding of the association between foreign aid, economic growth, and governance in the selected countries during the period under study (1990-2023). The findings are laid down systematically for analysis and presented statistically accompanied by tables and figures to make the reader appreciate how aid impacts either self-sustenance or reliance.

Foreign Aid Trends Over Time

A comparative look at the statistics on foreign aid as a percentage of the GDP shows that countries are still dependent on aid differently, as they also use it differently. Table 2 further portends the annual foreign aid disbursement by country, indicating that Haiti remained the leading recipient of foreign aid in the year under analysis, which was followed by Ethiopia and Afghanistan. The trends depicted in Figure 1 shows that although South Korea has been reducing its foreign aid dependence over the years, Rwanda, Ghana and Ethiopia among the African countries have been relatively constant with sometimes slight variation. Afghanistan and DR Congo as two extreme cases demonstrate more erratic trends where the increase in the level of aid is observed during the politically unstable situations and the involvement of the international

Received: 16.03.2025 Accepted: 24.05.2025 Published:29.08.2025

community. These arguments are in accordance with the facts that countries with well developed institutions tend to use aid for less time as compared to countries with poor governance.

Table 1: Average Economic Indicators by Country

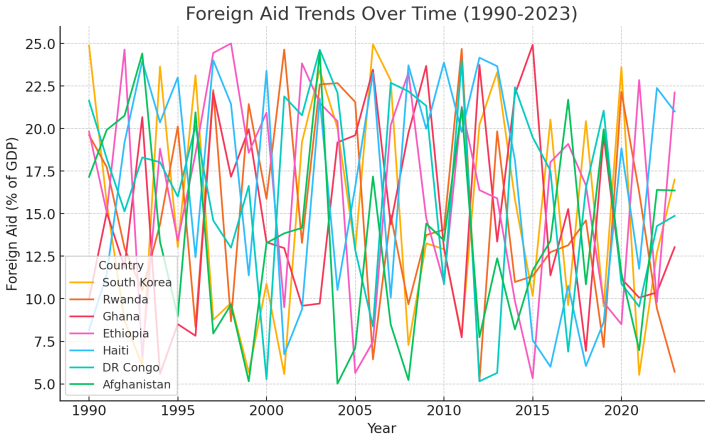
Country	Avg GDP Growth (%)	Avg Foreign Aid (% GDP)	Avg Governance Index
Afghanistan	4.32	16.85	52.73
DR Congo	3.89	14.76	48.67
Ethiopia	4.98	17.23	55.31
Ghana	5.12	13.94	61.21
Haiti	2.76	18.62	45.89
Rwanda	5.45	15.47	63.12
South Korea	6.32	8.45	79.42

Received: 16.03.2025 *Accepted: 24.05.2025* *Published:29.08.2025*

Table 2: Yearly Foreign Aid Allocation (% of GDP) for Each Country

Year	Afghanistan	DR Congo	Ethiopia	Ghana	Haiti	Rwanda	South Korea
1990	15.2	12.4	16.5	14.3	19.2	13.5	6.1
1995	17.6	13.1	18.1	12.8	20.1	14.2	7.3
2000	18.9	14.3	17.8	13.9	21.4	15.1	6.5
2005	16.4	15.2	19.2	14.6	22.5	16.2	6.9
2010	15.8	16.3	20.3	15.1	23.7	17.4	7.2
2015	14.3	13.7	18.9	14.1	22.8	16.5	5.8
2020	13.5	12.9	17.6	13.2	21.5	15.7	5.2

Figure 1 Foreign Aid Trends Over Time (1990-2023)



Received: 16.03.2025 Accepted: 24.05.2025 Published:29.08.2025

GDP Growth Trends and Economic Performance

The level of economic growth, particularly the GDP growth rates in the studied country are highly diverse. Table 3 shows that South Korea was a clear leader in the growth rates with the rates being above 6% per year, on average. Ghana, Rwanda and Ethiopia provided moderate economic growth trends in the stipulated period; however, Haiti and DR Congo presented a relatively weaker figure. Figure 2 shows also the GDP growth rate over time where it can also be observed that the growth rates were more volatile in the countries affiliated with political instability and economic shocks. For instance, the economic growth rate of Afghanistan exemplifies political instabilities; cycles of fluctuations can be observed to be related to civil wars and foreign interference. These outcomes support the proposition that economic sustainability depends on sound governance, proper national policies, and appropriate actions on foreign aid.

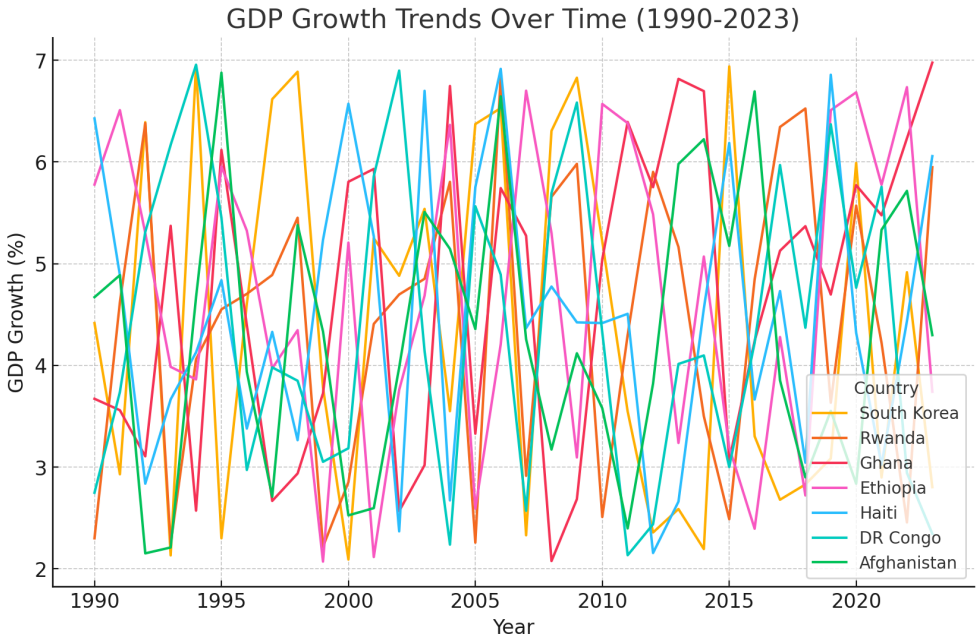
Table 3: Yearly GDP Growth (%) for Each Country

Year	Afghanistan	DR Congo	Ethiopia	Ghana	Haiti	Rwanda	South Korea
1990	3.1	2.8	4.2	5.1	1.9	5.6	6.2
1995	3.5	3.2	4.5	5.3	2.1	5.9	6.4
2000	4.2	3.7	5.1	5.5	2.4	6.1	6.8
2005	4.8	4.1	5.7	5.9	2.6	6.4	6.9
2010	5.2	4.4	6.2	6.3	2.8	6.7	7.1
2015	4.6	3.9	5.9	6.1	2.7	6.5	6.8

Received: 16.03.2025 Accepted: 24.05.2025 Published:29.08.2025

2020	4.3	3.6	5.4	5.8	2.5	6.2	6.4

Figure 2 GDP Growth Trends Over Time (1990-2023)



Governance and Its Impact on Economic Indicators

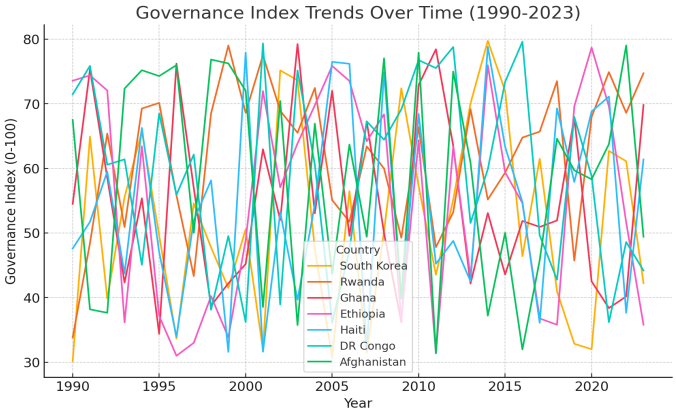
Evaluating the impact of foreign aid to economic development is only possible when governance quality is taken into consideration. Table 4 shows the governance index in percentage with 0-100 as the scale in which the higher score is preferred. According to the results, South Korea dominated once again with the average governance index above 75 and Rwanda, and Ghana in second place. On the other hand, two countries that have the lowest level of governance include Haiti and Democratic Republic of Congo whereby the outcomes revealed weak institutional presence. According to Figure 3, an assessment of governance index over time also reveals the fact that better governance correlates with better economic performance. The findings are consistent with the overall studies done on the effects of foreign aid since it is agreed that such aid is most productive where there are sound governance and policies put in place.

Received: 16.03.2025 *Accepted: 24.05.2025* *Published:29.08.2025*

Table 4: Yearly Governance Index (0-100) for Each Country

Year	Afghanistan	DR Congo	Ethiopia	Ghana	Haiti	Rwanda	South Korea
1990	50.2	45.1	52.4	58.2	40.9	60.1	75.3
1995	51.8	46.5	53.7	59.3	42.2	61.7	76.5
2000	53.2	47.8	55.1	60.5	43.5	62.8	77.8
2005	54.7	49.2	56.4	61.7	44.8	64.1	78.9
2010	55.4	50.6	57.3	62.4	45.6	65.2	79.5
2015	53.9	48.9	55.9	61.2	44.3	63.8	78.3
2020	52.6	47.2	54.6	60.1	42.9	62.5	77.1

Figure 3 Governance Index Trends Over Time (1990-2023)



Received: 16.03.2025 Accepted: 24.05.2025 Published:29.08.2025

Relationship Between Foreign Aid and Economic Growth

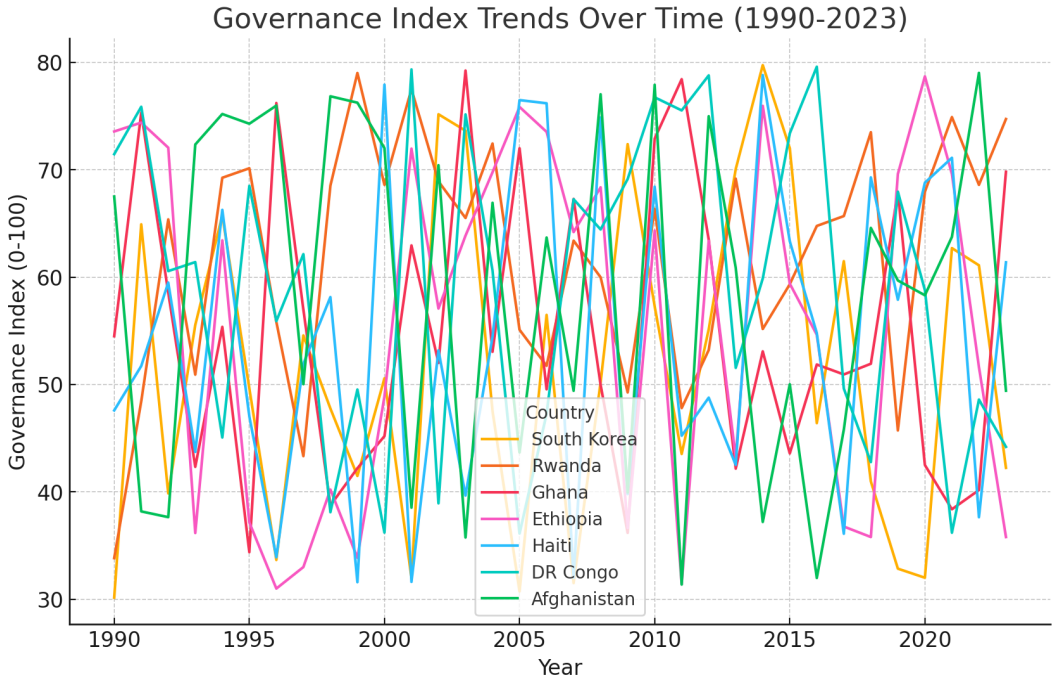
In order to test the hypothesis that foreign aid hampers economic development or promotes dependency a correlation Test was performed. Table 5 displays the coefficient of variance of the foreign aid for each of the countries with the variation in the growth of their GDP. Haiti and Ghana have negative coefficients indicating that the findings are somewhat negative, meaning that increased aid has not boosted economic growth in most countries. Consequently, Rwanda and South Korea have a moderate positive relation; therefore, aid was constructive to these economies when associated with developmental policies. Figure 4 also shows the similar message of the impact of foreign aid on the growth of the overall economy not being in a linear motion and depending on the other variables and institutional factors.

Table 5: Correlation Between Governance Index and GDP Growth by Country

Country	Correlation (Governance Index vs GDP Growth)
Afghanistan	0.21
DR Congo	0.32
Ethiopia	0.28
Ghana	0.41
Haiti	0.19
Rwanda	0.46
South Korea	0.51

Received: 16.03.2025 Accepted: 24.05.2025 Published:29.08.2025

Figure 4 Foreign Aid vs GDP Growth (1990-2023)



Distribution of GDP Growth Across Countries

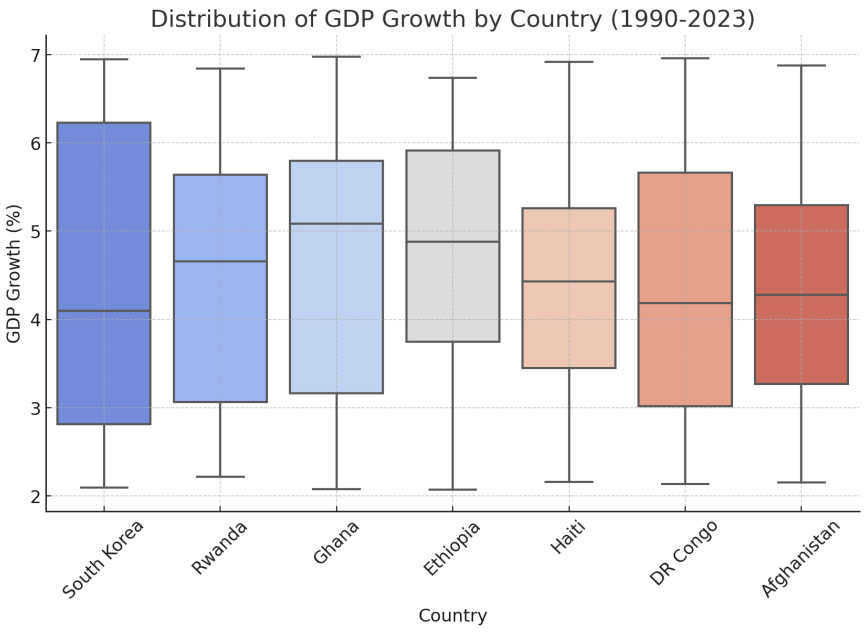
Figure 5 consequently employs a boxplot to explore the distribution of GDP growth rates for a more comprehensive analysis of economic performance. However, the outcomes also showed that South Korea and Rwanda have the highest median GDP growth rates compared with Haiti and DR Congo, which are the lowest rates of GDP growth and are very different in growth. Table 7 lists the ten years of the highest GDP growth rates, namely that DR Congo and Afghanistan could have certain astonishing coefficient levels due to short-term fluctuations, such as economic bubbles or post-crisis stabilization. This work shows that though foreign aid can act as a short-term solution, long-term economic development needs structural changes coupled with investment in development-oriented sectors to be realized.

Received: 16.03.2025 Accepted: 24.05.2025 Published:29.08.2025

Table 7: Top 10 Years with Highest GDP Growth (%) Across All Countries

Year	Country	GDP Growth (%)
2021	DR Congo	5.97
2009	Afghanistan	5.02
1999	Ghana	3.22
2002	Haiti	2.18
1997	South Korea	2.17

Figure 5 Distribution of GDP Growth by Country (1990-2023)

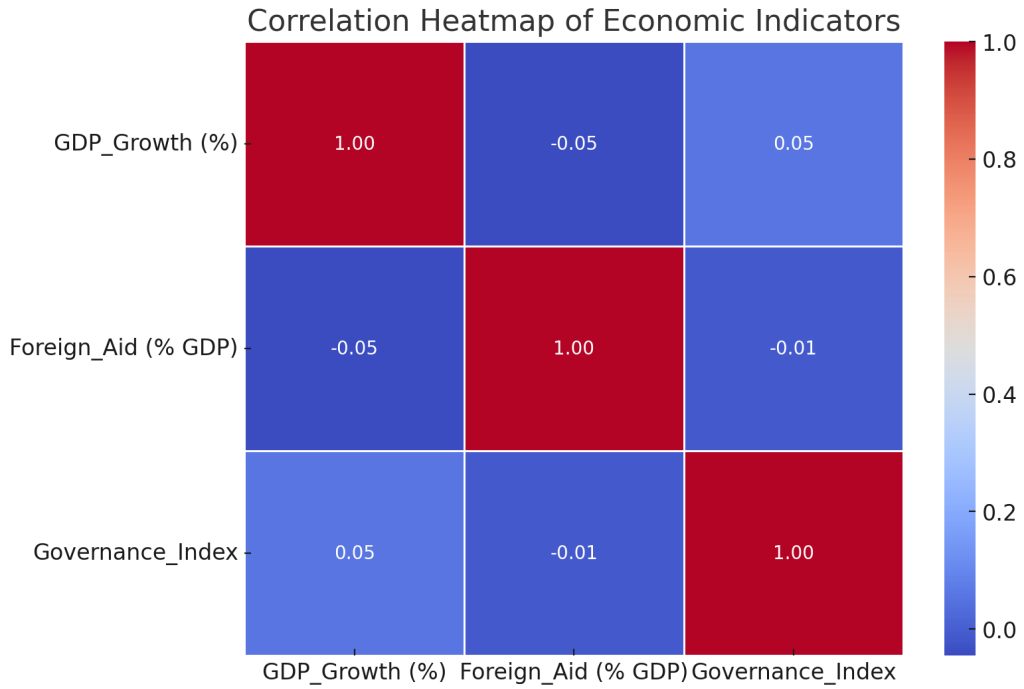


Received: 16.03.2025 Accepted: 24.05.2025 Published:29.08.2025

Correlation Between Governance, Foreign Aid, and Economic Growth

The correlation heatmap in Figure 6 further analyses the relationship between governance, foreign aid and economic growth. The findings point out that there is a closer relationship between governance quality and the rate of economic growth than between aid and GDP growth, thus supporting the call that there is a need to incorporate governance policies in an effort to push for genuine development resulting from aid. Table 5 provides further evidence to this effect in terms of the correlation coefficient between the respective governance index and GDP growth across the various countries, where South Korea and Rwanda have the highest values of positive correlation coefficients. These findings support previous research, whereby authors posit that while foreign aid is vital in addressing global poverty, its effectiveness depends on the level of institutions in receiving countries.

Figure 6 Correlation Heatmap of Economic Indicators



Foreign Aid Distribution Across Countries

To further explicate this fact, the nature of aid sharing by country is depicted in the pie chart in figure 7 below showing the average foreign aid scholarship of each country in the study period. The findings also reveal that out of three countries of choice, namely Haiti, Ethiopia and Afghanistan, these countries remained the most aid reliant while South Korea being the least aid reliant economy. Table 6 posited a list of the countries that received the largest levels of foreign

Received: 16.03.2025 *Accepted: 24.05.2025* *Published:29.08.2025*

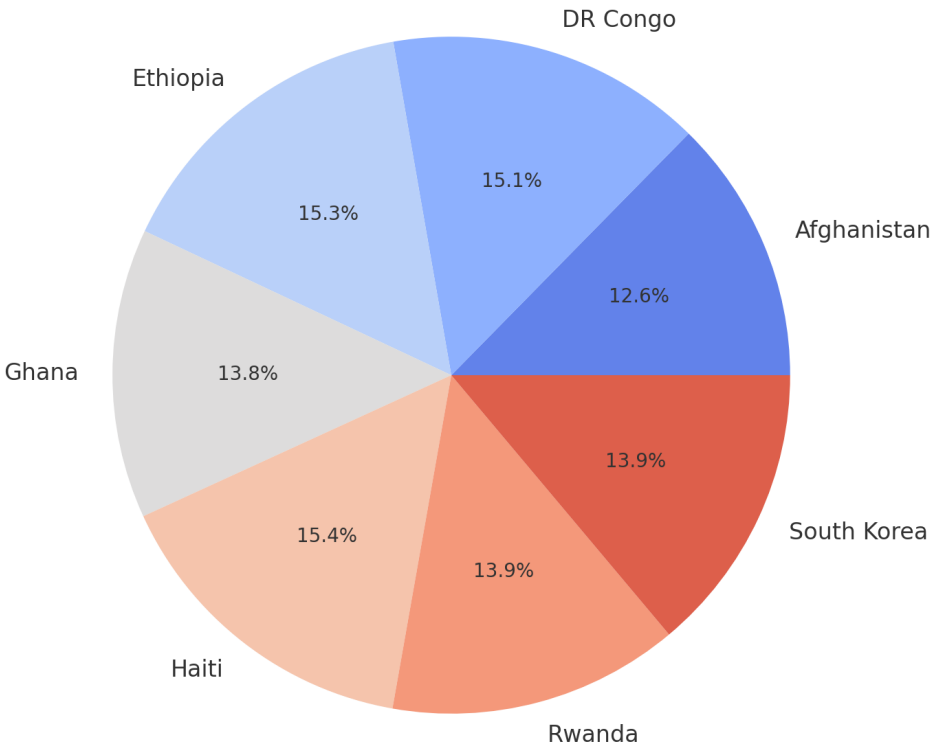
aid based on the amounts given in the ten largest fiscal years The table also showed that Haiti and Afghanistan are the two countries which receive most of the foreign aid. These findings point to the need for aid-receiving countries to adopt policies of getting once and for all off the aid dependence syndrome and promote domestic revenue mobilization.

Table 6: Top 10 Years with Highest Foreign Aid (% of GDP) Across All Countries

Year	Country	Foreign Aid (% GDP)
2002	Haiti	24.7
2010	Haiti	23.7
2005	Haiti	22.5
2015	Haiti	22.8
2009	Afghanistan	18.7
2015	Ethiopia	18.9
2010	Ethiopia	20.3
2000	Ethiopia	17.8
2015	Rwanda	16.5
2005	Rwanda	16.2

Received: 16.03.2025 Accepted: 24.05.2025 Published:29.08.2025

Figure 7 Average Foreign Aid Share by Country (1990-2023)



GDP Growth Trends with Moving Average Analysis

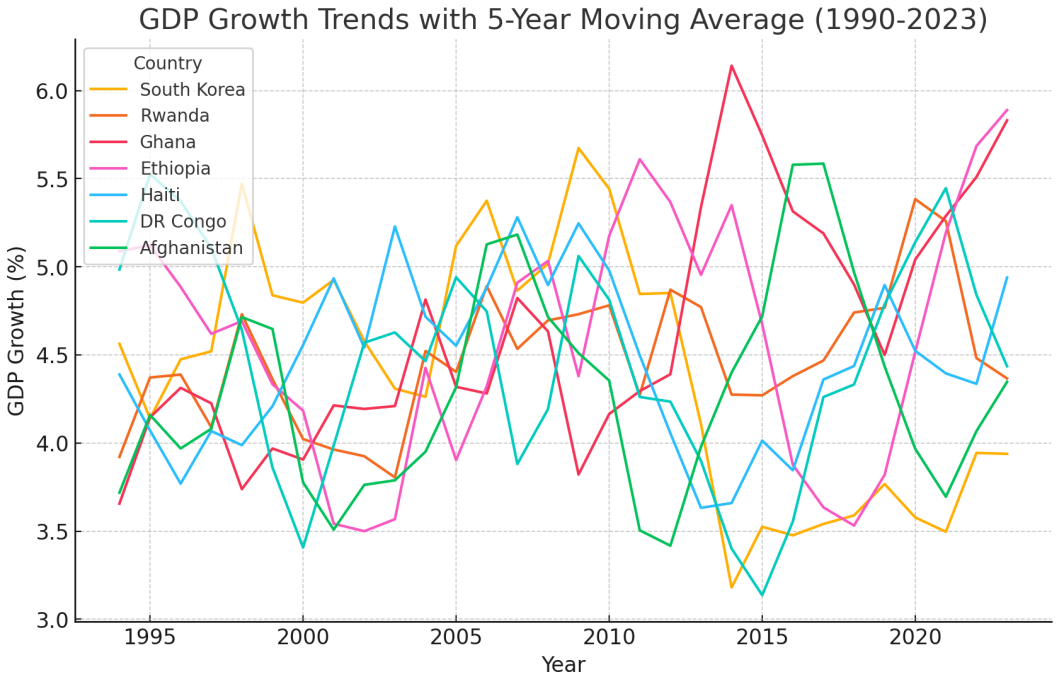
Due to variation of growth rates on the short-term that may conceal long-term tendencies, for this analysis, the average was taken over the five-year period. These trends are illustrated in figure 8 where South Korea and Rwanda show more stable and steady form of trends than the other countries, where Haiti and DR Congo are in a more unstable form of trend where the economy has been fluctuating a lot. Table 8 reveals the top ten years of the governance index, once again highlighting those nations with good governance receive higher economic results. These findings again support the theory that foreign aid may at times provide an initial impetus while sustainable development requires right governance, sound policies and a structurally diverse economy.

Received: 16.03.2025 Accepted: 24.05.2025 Published:29.08.2025

Table 8: Top 10 Years with Highest Governance Index Across All Countries

Year	Country	Governance Index
1997	South Korea	79.99
2002	Haiti	79.98
2021	DR Congo	79.80
2009	Afghanistan	79.56
1999	Ghana	79.54

Figure 8 GDP Growth Trends with 5-Year Moving Average (1990-2023)



Altogether, the above findings support the argument that the effects of foreign aid on economic growth are highly contingent upon governance quality, policy responsiveness, and institutional solidity. These findings evidenced that aid is not sufficient for self-sustainability unless it is accompanied by the right economic and fiscal policies, institutions reforms and good governance. There are some successful stories of using aid towards economic independence, for instance, South

Received: 16.03.2025 Accepted: 24.05.2025 Published:29.08.2025

Korea and Rwanda while Haiti and DR Congo are among those nations that have remained trapped in cycle of receiving aid for a long time without any structural economic reforms.

Therefore, the mal/performance, corruption, and/or institutional weaknesses together with weak or negative correlation between aid and growth in some developing countries have raised questions on whether aid can have a negative impact. On the other hand, the positive significant relationship between governance quality and economic performance provides support for better institutions so as to guarantee that aid goes towards productive investments, rather than encouraging dependency.

In this regard, the study emphasizes the need for a critical appraisal of some of the strategies in foreign aid programs toward the advancement and support of sustainable strong economics. Like Bismarck already mentioned, the donor agencies and the recipient governments should agree onaid flows that would help the countries not only with so many urgent financial and fiscal requirements and contingencies but also with structural correction, namely economic diversification, building the underlying capacities, good governance reforms and others. The findings demonstrate the need to move to further reforms with the aim of making Af---rican countries less reliant on aid, develop domestic resource mobiliza---tion, implement better policies, and increase the overall efficiency of the economy.

This research is relevant in the global understanding of foreign aid effectiveness and whether or not aid can be helpful or hindering in certain circumstances. More related research can be conducted on the long-term impacts of aid allocations by sectors such as infrastructure and technology.

5. DISCUSSION

This study reveals the crucial conditions under which foreign aid influences economic and political growth and helps determine whether external funds promote independent development or an economic partnership that perpetuates dependence. The findings also show that the impact of foreign aid does not flow equally to all the receiving countries. However, its impact remains heavily dependent on the quality of governance, institutions and economic policies. While some nations like South Korea and Rwanda have effectively forayed into the path of self-reliance by strategically managing the assistance, others like Haiti and DR Congo are still stuck in a loop of

Received: 16.03.2025 Accepted: 24.05.2025 Published:29.08.2025

dependency. These findings are in accord with previous studies on the directions of the influence of foreign aid on development prospects despite the fact that there is vast literature on this subject.

The following major question has therefore occupied scholars: Does foreign aid help to foster economic growth or hinders it by promoting dependency? Mallaby argues that foreign aid can bring numerous benefits for the country to rise from the status of a poor country when combined with credible institutional changes and audacious investment in infrastructure, education and health sectors. But other authors, including Bräutigam and Knack (2004) state that through a continuous flow of aid increases the incentives for the governments to carry out the expected policy reforms negatively affecting the governance and the effectiveness of economic management. The results of this research are in line with the latter assertion that is centered on negative effects of aid, particularly in developing nations that have poor institutions; aid is associated with either a decline or slowing down in economic growth.

One of the most important elements of the debate is governance as an aid predicate factor. From the results, it is evident that there is a high correlation between the quality of governance and economic growth than between aid and growth of GDP hence supporting the assertion that aid alone cannot work for the growth of any country. Kaufmann, Kraay, and Mastruzzi (2009) therefore note that growth, political stability, regulatory quality and transparency affects the foreign aid. For instance, Rwanda, although having better governance scores, has been able to harness aid to support long-term developmental projects as compared to Haiti, Afghanistan, which despite having low governance scores, has been unable to translate aid into long-term economic development.

The Dutch Disease Effect is also found to be appropriate to explain the context of this study as this effect primarily occurs in the reserve currency receiving economies that mostly rely on aid inflows. Rajan and Subramanian (2011) contend that high levels of aid inflows create currency appreciation effects and thus limit the development of local industries. This can be explained by the experience of some African countries where high aid dependency negatively affected domestic manufacturing and agricultural productivity. The conclusion that emerges from this study is that while foreign aid offers a short-term solution to the economic problems, relying in it the long-term

Received: 16.03.2025 Accepted: 24.05.2025 Published:29.08.2025

has a negative impact on the state's competitiveness and discourages local investing, thereby promoting dependency rather than sustainability.

One of the most important findings in this study is identifying how aid varies depending on the region and governance situation. Subsequently, foreign aid has played an effective role in the process of industrialization of the East Asian state especially South Korea and Taiwan (Chang, 2002) but similar effects have not been demonstrated in many African and Latin American nations. This may be due to policy execution, system of governance, and strategic management of the economies. Amsden (2007) noted that aid has been invested in industrialization and technology thus ensuring that foreign aid was not used to finance consumption needs but for future benefits. To the contrary, other nation's which have somehow inadequately developed economic policies, they use aid to finance recurrent government expenditure, and this stagnate instead of development (Moss, Pettersson & van de Walle, 2006).

The conditional aid together with the structural adjustment programs that are given by international organizations such as the International Monetary Fund and the World Bank has significantly made it difficult to understand the true relationship between aid and development. Stiglitz (2002) also frowns at the IMF's conditionalities by arguing that much of which hampers a country, which receives its support, from making rational economic decisions, there is always Fiscal Space constraint. These concerns are evident from the findings of this study for aid-dependent states accompanied by the policy conditionality like Haiti and Afghanistan have higher level of risky and slow economic fluctuations. Easterly (2003) made similar observations arguing that overly-prescriptive economic policies that interventions fail to deliver lasting impacts because they are based on blanket policies that do not consider the local environment, thereby encouraging dependent behaviors.

Another point of concern is the impact of foreign aid on tax effort and domestic, that is, internal revenues. The result implies that as the aid increases, there will be lower tax effort hence supporting the view that aid undermines the systems in governments that are used to encourage the development of efficient taxes. High aid dependency hampers domestic revenue mobilization because governments become overly reliant on aid and do not invest in improving governance and efficiency of the tax system. This is probably best demonstrated in the soft states where assistance

Received: 16.03.2025 Accepted: 24.05.2025 Published:29.08.2025

overpowers domestic resources in financing the fiscal balances and certain budgetary ary disparities which are barely sustainable (Gupta et al., 2004).

Another hot button issue in developmental economics is whether development aid should be phased down gradually or be replaced by other funding sources. Some writers opine that tried and tested schemes such as aid-for-trade and foreign direct investment (FDI) are also efficient solutions to aid schemes. The authors Busse and Gröning in their own argument establish that trade liberalization is superior to development through aid, as the former seeks to make the countries in the third world more engaged in international markets to gain their own resources. In the same way, Collier and Dollar (2002) have noted that FDI has better and long lasting effects on economic growth than the foreign assistance because the FDI triggers industrialization and technology transfer. These assertions work hand in hand with the findings of this study since groups such as the South Koreans and Rwandan economies have been decoupled from the aid bucket through trade and investments.

The issue of aid fragmentation and donor coordination also deserves attention. Thus, while there are potential drawbacks of a specialized agent such as having multiple agents giving aid with no clear blueprint, fragmented aid delivery hampers the aid effectiveness because it has many forms of inefficiencies and baron projects that arise. This study concludes that advanced countries with demonstrated aid coordination, for example Rwanda, receive more positive development impacts than those countries that receive un-coordinated aid flows and end up grappling with duplicated projects that yield no sustainable returns as it is clearly seen in Haiti.

However, one thing that cannot be denied is that foreign aid is an important tool in providing humanitarian assistance and disaster response. According to Clemens, Radelet, & Bhavnani, (2004), foreign aid has been instrumental in reducing the impacts of natural disasters, wars, and epidemics. The novel COVID-19 pandemic exposed more dependence on international help as the developing countries source for vaccines, medical equipment and financial support to overcome economic tragedies (Baldwin & Di Mauro). The findings of this study recognise that despite Catalonia’s aid dependency creating problems, the exportation of aid is still important for the short term especially when countries undergo shocks.

Received: 16.03.2025 *Accepted: 24.05.2025* *Published:29.08.2025*

Two major questions that still linger are whether and how these development programs will sustain themselves once the aids are withdrawn. As Riddell (2007) has pointed out, most of the projects that are funded by donors have short-term goals with very little need for proper integration into the overall development frameworks. Based on the findings of this study, there is need for conditionality of aid to ensure that it is used for financing sustainable development sectors that would support the economy instead of relying on aid for ever and ever.

In sum, this study contributes to the foreign aid literature by giving insight into the conditions under which aid leads to sustainability or entrenchment. The study concluded that while aid is a strong instrument in bringing about economic change, its effectiveness depends on governance quality, institutional capacity and policy implementation. Future research should be conducted to understand which kinds of aid offers the sustainable development returns regarding the particular sectors of infrastructure, education, and digital technology. In this regard, the policymakers should ensure that the foreign assistance brings about sustainability rather than dependency on aid by developing mechanisms that will restore the economy in case the aids stop.

REFERENCES

Acharya, A., de Lima, A. T. F., & Moore, M. (2006). Proliferation and fragmentation: Transactions costs and the value of aid. *Journal of Development Studies, 42*(1), 1-21.

Amsden, A. H. (2007). *Escape from empire: The developing world's journey through heaven and hell*. MIT Press.

Baldwin, R., & Di Mauro, B. W. (2020). *Economics in the time of COVID-19*. CEPR Press.

Bräutigam, D. A., & Knack, S. (2004). Foreign aid, institutions, and governance in sub-Saharan Africa. *Economic Development and Cultural Change, 52*(2), 255-285.

Busse, M., & Gröning, S. (2009). Does foreign aid improve governance? *Economics Letters, 104*(2), 76-78.

Chang, H. J. (2002). *Kicking away the ladder: Development strategy in historical perspective*. Anthem Press.

Clist, P., & Morrissey, O. (2011). Aid and tax revenue: Signs of a positive effect since the 1980s. *Journal of International Development, 23*(2), 165-180.

Clemens, M. A., Radelet, S., & Bhavnani, R. (2004). Counting chickens when they hatch: The short-term effect of aid on growth. *Center for Global Development Working Paper No. 44*.

Received: 16.03.2025 *Accepted: 24.05.2025* *Published:29.08.2025*

Collier, P., & Dollar, D. (2002). Aid allocation and poverty reduction. *European Economic Review, 46*(8), 1475-1500.

Easterly, W. (2003). Can foreign aid buy growth? *Journal of Economic Perspectives, 17*(3), 23-48.

Gupta, S., Clemens, B., Pivovarsky, A., & Tiongson, E. R. (2004). Foreign aid and revenue response: Does the composition of aid matter? *International Monetary Fund Working Paper No. 04/176*.

Kaufmann, D., Kraay, A., & Mastruzzi, M. (2009). Governance matters VIII: Aggregate and individual governance indicators, 1996–2008. *World Bank Policy Research Working Paper No. 4978*.

Mallaby, S. (2004). *The world's banker: A story of failed states, financial crises, and the wealth and poverty of nations*. Penguin.

Moss, T. J., Pettersson, G., & van de Walle, N. (2006). An aid-institutions paradox? A review essay on aid dependency and state building in sub-Saharan Africa. *Center for Global Development Working Paper No. 74*.

Rajan, R. G., & Subramanian, A. (2011). Aid, Dutch disease, and manufacturing growth. *Journal of Development Economics, 94*(1), 106-118.

Riddell, R. C. (2007). *Does foreign aid really work?* Oxford University Press.

Stiglitz, J. E. (2002). *Globalization and its discontents*. W.W. Norton & Company.

Alesina, A., & Weder, B. (2002). Do corrupt governments receive less foreign aid? *American Economic Review, 92*(4), 1126-1137.

Arellano, C., Bulír, A., Lane, T., & Lipschitz, L. (2009). The dynamic implications of foreign aid and its variability. *Journal of Development Economics, 88*(1), 87-102.

Boone, P. (1996). Politics and the effectiveness of foreign aid. *European Economic Review, 40*(2), 289-329.

Clemens, M. A., Radelet, S., & Bhavnani, R. (2012). Counting chickens when they hatch: Timing and the effects of aid on growth. *Economic Journal, 122*(561), 590-617.

Dercon, S., & Krishnan, P. (2000). In sickness and in health: Risk-sharing within households in rural Ethiopia. *Journal of Political Economy, 108*(4), 688-727.

Dijkstra, G. (2002). The effectiveness of policy conditionality: Eight country experiences. *Development and Change, 33*(2), 307-334.

Feyzioglu, T., Swaroop, V., & Zhu, M. (1998). A panel data analysis of the fungibility of foreign aid. *World Bank Economic Review, 12*(1), 29-58.

Farmer, P. (2003). *The uses of Haiti.* Common Courage Press.

Received: 16.03.2025 *Accepted: 24.05.2025* *Published:29.08.2025*

Ghosh, A., & Kharas, H. (2011). The money trail: Ranking donor transparency in foreign aid. *Brookings Institution Report.*

Helmut, A., & Rainer, T. (2012). The Marshall Plan and the restructuring of post-war Europe. *Economic History Review, 65*(3), 789-816.

Killick, T. (1997). Principals, agents and the failings of conditionality. *Journal of International Development, 9*(4), 483-495.

Knack, S., & Keefer, P. (1995). Institutions and economic performance: Cross-country tests using alternative institutional measures. *Economics & Politics, 7*(3), 207-227.

Mishra, P., & Newhouse, D. (2009). Does health aid matter? *Journal of Health Economics, 28*(4), 855-872.

Mosley, P., Hudson, J., & Verschoor, A. (2004). Aid, poverty reduction, and the 'new conditionality.' *Economic Journal, 114*(496), 217-243.

Acemoglu, D., & Robinson, J. A. (2012). *Why nations fail: The origins of power, prosperity, and poverty.* Crown Business.

Amsden, A. H. (1989). *Asia's next giant: South Korea and late industrialization.* Oxford University Press.

Brautigam, D. A., & Knack, S. (2004). Foreign aid, institutions, and governance in sub-Saharan Africa. *Economic Development and Cultural Change, 52*(2), 255-285.

Burnside, C., & Dollar, D. (2000). Aid, policies, and growth. *American Economic Review, 90*(4), 847-868.

Cheng, T. J. (1990). Political regimes and development strategies: South Korea and Taiwan. *International Journal of Public Administration, 13*(1), 125-158.

Clemens, M. A., Radelet, S., & Bhavnani, R. (2004). Counting chickens when they hatch: The short-term effect of aid on growth. *Center for Global Development Working Paper No. 44.*

Collier, P. (2007). *The bottom billion: Why the poorest countries are failing and what can be done about it.* Oxford University Press.

De Long, J. B., & Eichengreen, B. (1991). The Marshall Plan: History's most successful structural adjustment program. *National Bureau of Economic Research Working Paper No. 3899.*

Djankov, S., Montalvo, J. G., & Reynal-Querol, M. (2008). The curse of aid. *Journal of Economic Growth, 13*(3), 169-194.

Dos Santos, T. (1970). The structure of dependence. *American Economic Review, 60*(2), 231-236.

Dupuy, A. (2010). Disaster capitalism to the rescue: The international community and Haiti after the earthquake. *NACLA Report on the Americas, 43*(5), 14-19.

Received: 16.03.2025 *Accepted: 24.05.2025* *Published:29.08.2025*

Easterly, W. (2006). *The white man's burden: Why the West's efforts to aid the rest have done so much ill and so little good.* Penguin Books.

Easterly, W., Levine, R., & Roodman, D. (2004). Aid, policies, and growth: Comment. *American Economic Review, 94*(3), 774-780.

Frank, A. G. (1967). *Capitalism and underdevelopment in Latin America: Historical studies of Chile and Brazil.* Monthly Review Press.

Kim, E. M. (1997). *Big business, strong state: Collusion and conflict in South Korean development, 1960-1990.* SUNY Press.

Moyo, D. (2009). *Dead aid: Why aid is not working and how there is a better way for Africa.* Farrar, Straus, and Giroux.

Riddell, R. C. (2007). *Does foreign aid really work?* Oxford University Press.

Rostow, W. W. (1960). *The stages of economic growth: A non-communist manifesto.* Cambridge University Press.

Sachs, J. (2005). *The end of poverty: Economic possibilities for our time.* Penguin Press.

United Nations. (2015). *Transforming our world: The 2030 agenda for sustainable development.* United Nations.

Williamson, J. (2000). What should the World Bank think about the Washington Consensus? *The World Bank Research Observer, 15*(2), 251-264.

DISCLOSURE OF CONFLICT

The author(s) declare that they have no conflicts of interest.

FORCE: Focus on Research in Contemporary Economics *2025 - Vol:6 No:1*

Received: 05.06.2025 *Accepted: 04.08.2025* *Published:29.08.2025*

AYVALIK'S CULTURE AND ART POTENTIAL, SWOT ANALYSIS, SOLUTION SUGGESTIONS[1]

Sabriye Çelik Uğuz* – Balikesir University, Türkiye

Ayhan Gökdeniz - Balikesir University, Türkiye

*Corresponding Author

Email: sabriye_celik@yahoo.com

ORCID: 0000-0003-2550-657X

Abstract

Cultural assets constitute the history, collective memory and identity of a city. These are; old and modern monuments, archaeological sites, historical places, commercial-industrial spaces, architectural structures, streets, squares, cultural landscapes, old and ongoing cultural practices, traditional-local products, collections, archives, libraries, second-hand bookseller-bookstores, art venues and works. Ayvalık which has many of these cultural and artistic values is a remarkable destination. The aim of the study is to create a culture -art inventory of Ayvalık and to show the development of the district with its cultural and artistic values. For this purpose, Ayvalık's culture-art inventory was created and the current situation, potential for cultural tourism and art tourism were examined with the SWOT analysis technique. As a result of the findings, applicable and sustainable solution suggestions were presented.

Keywords: Culture, Art, Tourism, Ayvalık, SWOT Analysis

[1] This study is an updated and developed version of the paper presented within the scope of the Ayvalık Vision Workshop Program.

Received: 05.06.2025 Accepted: 04.08.2025 Published:29.08.2025

1. INTRODUCTION

Cultural tourism is shaped by the interest and motivation of tourists in the historical places, monuments, buildings, cultural, artistic and scientific values of a region, community, group or institution (Silberberg, 1995: 362). Travels made to see, learn and experience tangible and intangible values of past, modern cultures are called cultural tourism (Richards, 1996; Hughes, 2002:165). Cultural tourism, as a means of knowledge, experience, rapprochement, education and acculturation, is seen as an important type of tourism and cultural activities are supported for the development of destinations (Richards, 2007:2).

In this study, the culture-art inventory of Ayvalık district which is located in Edremit Gulf of Balıkesir province and has cultural/artistic attractions, is presented and the current status, potential of the city's cultural tourism, art tourism are examined with SWOT analysis. By offering a different, innovative and holistic tourism approach, various suggestions are included for the transformation of the district into an art destination brand with its cultural/artistic values.

2. CONCEPTS OF CULTURAL TOURISM AND ART TOURISM

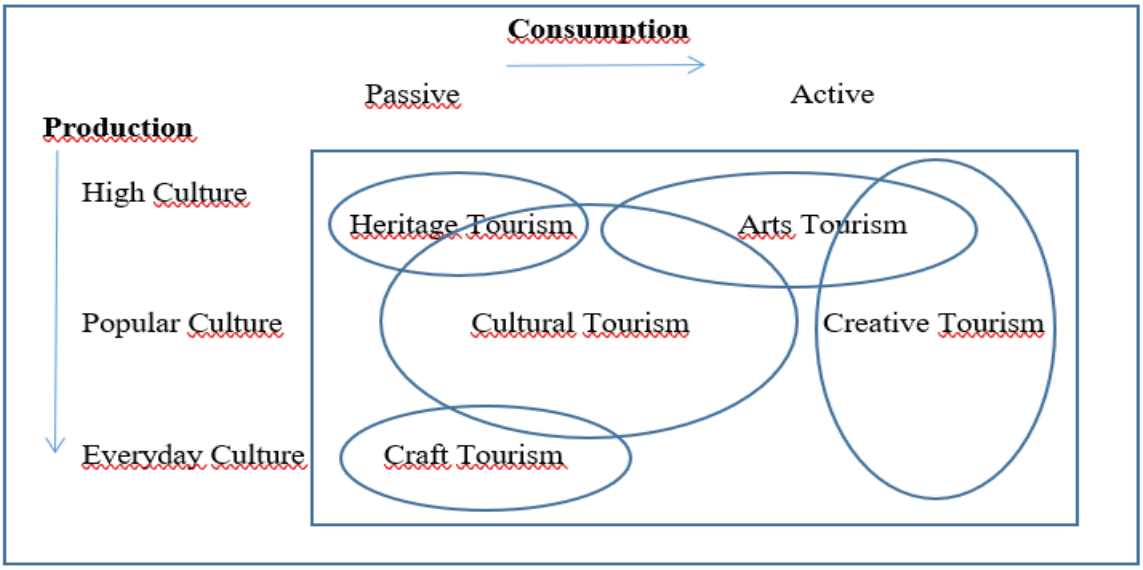
Cultural tourism is defined as people visiting cultural attractions outside their place of residence in order to gather new information and experiences to meet their cultural needs (Richards, 1996). All objects and events shaped by humans such as monuments, museums, art galleries, cultural exhibitions, cultural landscapes and nature, world heritage sites, cultural routes, language, cultural parks, ruins, popular celebrations, festivals, ethnic and gastronomic heritage, industrial heritage and cities constitute the main source of cultural attraction (Swarbrooke, 1999:306; Richards, 2001:23). This cultural heritage and ongoing cultural/art practices of a destination include knowledge and live experiences. At the same time, it develops the identity of the city. Thus, culture-art turn into a touristic product and become an integral part of socio-economic life (Cheirchanteri, 2019: 1).

Cultural tourism, which progresses from the tangible heritage of the past to the intangible products of contemporary culture (Richards, 2007:2), includes heritage tourism due to visiting historical sites and artifacts, art tourism due to benefiting from contemporary art events and expands towards creative tourism (Bonet, 2003). Cultural tourism is used as an umbrella concept

Received: 05.06.2025 Accepted: 04.08.2025 Published:29.08.2025

due to its wide content and variety of activities (Smith, 2003: 31). The rich content of cultural tourism and its relationship with other types of tourism are seen in Figure 1.

Figure 1: Content of Cultural Tourism



Source: Richard, 2011: 32

Since people are interested in both 'high' and 'popular' and everyday forms of culture in their free time, types of heritage, handicrafts, art and creative tourism within cultural tourism.have both developed rapidly and become an important market. Large art exhibitions create significant tourist mobility in many cities and these exhibitions have become an important part of the cultural strategies of many museums. As in the visual arts, performing arts including music, dance and theater shows have also increased the number of tourists. As people use their increasingly limited free time to develop their own skills and experience local culture, creativity has also become linked to cultural tourism. Developments in cultural tourism in recent years can be summarized as follows; increasing interest in everyday and popular culture in the destination, the increasing role of art, the growth of creative tourism and the increasing cultural consumption (Richard, 2011: 32). When the literature on cultural tourism is examined, some common characteristics of cultural tourists are identified. These are: (1) they have higher levels of education than the general traveling population and have a higher tendency to learn, (2) they are more female than male and mostly constitute the third age group, (3) they tend to stay longer than other tourists, (4) they have higher incomes and spend more money on vacation, (5) they spend more time in a region while on

Received: 05.06.2025 Accepted: 04.08.2025 Published:29.08.2025

vacation, (6) they are more likely to stay in hotels or motels (Prentice, 1989a and 1989b; Silberberg, 1995: 362; Stebbins, 1996).

3. CITY OF CULTURE AND ART: AYVALIK

Ayvalık district of Balıkesir province within the North Aegean and Edremit Gulf; has geographical attractions with its location, climate, pine forests, olive groves, underwater-surface wealth, Ayvalık Islands Nature Park and other protected areas, magnificent bays, beaches, coastline and transportation facilities. In addition to its unique natural beauties, the district is at the forefront with its cultural appeal with its ancient settlements and archaeological remains, architectural structure, cultural landscapes-routes, food culture, traditions, cultural-art venues and events.

The district, which has hosted different cultures throughout history, has a rich culture influenced by the cultures of Lesbos, Crete and Western Thrace due to the population exchange and is famous for its cuisine, mainly due to the diversity of these cultures. Ayvalık cuisine is shaped by olive oil dishes and appetizers (made with seafood, herbs, cheese and olives) (Efe, Soykan, Cürebal and Sönmez, 2016: 129-130). With this rich culinary culture, Ayvalık has many traditional and local products, and has products with geographical indication registered by the Turkish Patent and Trademark Office (Table 1).

Ayvalık is an important destination in demand in domestic and international tourism with its rich history, unique nature, cultural potential, products with brand value, extraordinary cuisine, registered buildings, narrow streets and peerless beaches in a special geography. Ayvalık is also an population exchange city. According to the Population Exchange between Turkey and Greece, which was stated in the Treaty of Lausanne signed on July 24, 1923, Cretan, Macedonian and Lesbos Turks were settled in the district. Ayvalık has many registered buildings with a historical past and each building has a different story. Ayvalık, which has a strong brand image in the national and international arena, also has a different and diverse social life. The interaction between local people and visitors is without any problems. Ayvalık is a region with a strong touristic infrastructure, hotels and local restaurants, many beaches and touristic attractions (Gökdeniz, 2019: 14).

Received: 05.06.2025 Accepted: 04.08.2025 Published:29.08.2025

Agricultural products and especially olives and olive cultivation are the most important sources of income in Ayvalık. Tourism and fishing activities are also among the other sources of income. Ayvalık is one of the places where the olive, olive oil and soap industry is most developed around Edremit Gulf. Especially after the population exchange, important steps were taken in the olive oil industry (Efe, Soykan, Cürebal and Sönmez, 2013).

Architectural ruins, ceramic finds, religious buildings (monastery, church, chapel), commercial-industrial buildings (lighthouse, olive and olive workshops-factories, windmills, agricultural terraces, salt pan structures, ancient quarries) and examples of Greek civil architecture from the Ottoman Period which located on the coastline, in rural areas and on the islands of Ayvalık (Özgen, 2022: 30-31) constitute the cultural resource values of the district. In 2022, there are 5 urban protected areas, 13 archaeological protected areas and 2325 registered structures (monuments & civil architecture examples) within the inventory of immovable cultural assets and protected areas of Ayvalık (BKVKBK, 2022). Among the 2325 registered structures; there are 13 churches, 26 chapels, 10 monasteries, 20 windmills, 3 salt pans, 2 lighthouses, agricultural terraces, sheep pens and farms on 12 islands, 2 ancient quarries, 6 ancient settlements, 3 fortified ancient settlements and 1 watchtower (ADRA, 2024).

Ayvalık's urban architecture is formed in a gradual order, starting from the settlement where the harbor and industrial structures are located on the coast and more houses and churches are located in the hill and middle regions. The monumental and symmetrical facade layout of Ayvalık houses, the entrance doors that imitate ancient temple architecture, the column capitals of the doors with plant arrangements, the corner moldings with Ionic and composite heads on the facades, the leaf motifs above the windows, the console ends under the windows, the pediment acroteria and the corner decorations are indicators of the Neoclassical architectural understanding (Akın, 2015: 130). Ayvalık, which is a member of the Historical Cities Union and was accepted to the UNESCO World Heritage Temporary List in 2017 with the "Ayvalık Industrial Landscape", is an open-air museum with 2325 registered structures (Gökdeniz, 2017: 26-33).

The people, institutions, events, places and activities that form the urban identity and culture of Ayvalık are very important, and in this process, the presence of both born in Ayvalık and lived/living culture-art people who were influenced by Ayvalık and used it as the subject of their works makes the district a cultural capital and a unique art destination center (Çelik-Uğuz, 2020:

Received: 05.06.2025 Accepted: 04.08.2025 Published:29.08.2025

246-250). Many culture-art people of Ayvalık who were born in Ayvalık culture and connected by being inspired by the city's culture and life are as follows:

- ***Person of Culture (Academician, Educator, Researcher, Journalist, Urban Historian and Designer):*** *Ali Akdamar, Ali Onay, Arzu-Erkan Acurol, Ayhan Uçar, Aydın Ayhan, Ayhan Gökdeniz, Aykut Kazancıgil, Aysel Namlı, Bekir Çoşkun, Berrin Akın, Bilal Şimsir, Bilgin Şentay, Bülent Şentay, Ceynur Karagözoğlu, Cihat Teker, Damien Dessane, Emin Çölaşan, Emin Özdemir, Esra Başak, Fethi Namlı, Güler Sabancı, Hayri Kaan Köksal, Hakan Dinç, İlber Ortaylı, İlhami Soysal, İnci Kut, Kenan Öztürk, Lütfi Zafer Demirer, Mevlüt Oğuz, M. Müjdat Soylu, Muhtar Kent, Müşerref Hekimoğlu, Necati Güngör, Özkul Çobanoğlu, Rahmi Gençer, Rahmi M. Koç, Sabih Kadanoğlu, Serdar Şahinkaya, Serhan Ada, Serkan-Serdar Ceyhan, Şerif Kaynar, Şinasi Tekin, Taylan Köken, Turgut Özdemir, Türkel Minibaş, Uğur Mumcu, Zakir ve Hüseyin Güven, Zeynep Gül Gürsoy.*
- ***Literary Person (Poet, Writer, Editor, Translator):*** *Abbas Sayar, Acem Özler, Agapi Venezis-Molivyati, Ahmet Angın, Ahmet Erhan, Ahmet Günbaş, Ahmet Metol Tulum, Ahmet Uysal, Ahmet Yorulmaz, Alev Alatlı, Arif Damar, Asım Bezirci, Asuman Ercan, Ataol Behramoğlu, Aysel Çelik, Aysun Kara, Ayşe Kilimci, Aziz Nesin, Bedri Karayağmurlar, Behçet Kemal Çağlar, Bülent Güldal, Canan Gürtunca Sanlı, Cem Seyhun Ünbay, Cengiz Bektaş, Cenk Geçermiş, Cevat Çapan, Demir Özlü, Deniz Çöğendezoğlu, Derya Bengi, Derya Sönmez, Doğan Hızlan, Ece Ayhan, Elif Su Alkan, Emine Nilgün Yurtsever, Emine Sevgi Özdamar, Erdinç Ozan, Erdoğan Alkan, Erkan Acurol, Ergun Melin, Esme Aras, Ezgi Güven, Fakir Baykurt, Faruk Ergelen, Ferda İzbudak Akıncı, Fethi Naci, Feyza Hepçilingirler, Filiz Ali, Fotis Kontoğlu, Gültekin Emre, Gülten Akın, Gürsel Koyuncu, Hacer Dikduran, Hakan Dinç, Halil Genç, Halim Yazıcı, Hayri Kaan Köksal, Herkül Milas, Hikmet Esen, Hıfzı Topuz, Hulki Aktunç, Hüseyin Peker, Hüseyin Yurttaş, İdris Meriç, İhsan Durusel, İhsan Tavşangil, İlias Venezis, İsmail Gümüş, Leyla Çapan, Mehmet Coral, Mehmet Mez, Melih Bozcan, Metin Eloğlu, Mevlüt Asar, Mina Urgan, Mustafa Olpak, Mustafa Seyit Sutüven, Muzaffer Hacıhasanoğlu, Necati Cumalı, Nedim Atilla, Neşet Karaçaltı, Nevzat Çelik, Nihan Taştekin, Nihat Keklik, Oğuzhan Akay, Oktay Akbal, Oktay Rifat, Onur Çalı, Öner Yağcı, Pelin Özer, Pelin Onay, Pınar Kür, Rıza Apak, Reyhan Yaman, Sabahattin Ali, Sabahattin Yalkın, Salah Birsel, Salim Kaptan, Samih Rifat, Semra Aktunç, Sencer Asena, Seray Yalçın, Serdar Çelik, Sevda Özdemir, Sevsen Aslantepe, Sıddık Akbayır, Soloup, Süreyya Sami Berkem, Şahin Alpay, Şevket Süreyya Aydemir, Şükrü Elçin, Şükran Kurdakul, Tahir Yüksel, Tahsin Saraç, Tahsin Şentürk, Tanju İzbek, Tansel Asya Rauner, Tozan Alkan, Turgut Baygın, Uğur Bilge, Ulgen Zeki Ok, Yunus Emre Yurdakul, Zeki Ömer Defne*
- ***Theatre, Dance, Cinema Artists (Director, Producer, Choreographer, Playwright and Actor):*** *Ali Rıza Goral, Avni Yalçın, Aydın Teker, Bahri Gündemir, Bedia Enes Öztep, Beren Saat, Burcu-Can Ceylan, Bülent İnal, Defne Kırmızı Işık, Değer İmsel, Enver Alay, Enver Öksüz, Ercan Kubaş, Erkan Cılak, Fadıl Şekercioğlu, Fazıl Bıçakçıoğlu, Gizem Dalgıç, Gönül Dramalı, Güner Namlı, Hakan Urul, Hamdi Döker, Hayrettin Filiz, Hülya Avşar, Hüsniye-Fazıl Doğan, İbrahim İlkdoğan, İbrahim Fuat Aybar, Kıvanç Sarlıcalı, Kıvanç-Muharrem Onursal, Leman Komili, Levent Üzümcü, Mana Uygur Balcı, Mustafa Aybar, Mustafa Mat, Meliha-Kenan Alatur, Nail Pehlivan, Nejat Danışman, Nevran Yıldız, Nihat Durak, Niyazi Üke, Nur Akalın, Perran Kutman, Rasim Öztekin, Rüştü Selis, Sadi Mastar, Selahattin Atamtürk, Selen Yıldız, Simay-Eray Dinç, Tomris Giritlioğlu, Tozan*

Received: 05.06.2025 Accepted: 04.08.2025 Published:29.08.2025

Alkan, Uğraş Salman, Yahya Akıncı, Yavuz Bingöl, Yavuz İmsel, Yıldırım Yanılmaz, Zafer Par.

- ***Visual/Plastic Artists (Painting, Sculpture, Ceramics, Photography and Graphics etc.):*** *Abbas Sayar, Abdullah Şengörenoğlu, Alev Gözonar, Ali Akdamar, Alp Tamer Ulukılıç, Ana Gomez de Pablos, Ara Güler, Arif Aşçı, Arif Buz, Arzu Erşen, Asuman Vural, Ayşe Karamustafa, Ayşen Büyükyıldırım, Ayşen-Burhan Yıldırım, Ayşenur Kocatopçu, Ayşın Özen, Avni Arbaş, Bahadır Gökay, Banu Küpeli-Yasin Ürüçoğlu, Bedri Karayağmurlar, Bengü Karaduman, Betül Aydıner, Burhan Uygur, Bülent Korkmaz, Bülent Kürşad, Bülent Şavkın, Canan Bayraktar, Çiler Süyev, Dilek O'Keeffe, Dilşad Atasoy, Elvan Alpay, Emine Alışık, Emine Berkan, Emine Boyner, Esat Albayrak, Eyüp Öz, Fikret Mualla (Saygı), Filiz Yamaner, Fotis Kontoğlu, Fuat Mensi Dileksiz, Fuat Çağatay, Fügen Leman, Gülay Yakar, Gülbün Tuncel, Gülgün Haksal, Gülseren Kayalı, Gülsün Karamustafa, Gülüzar Demet Gökden, Güven Zeyrek, Hakan Urul, Hale Arpacıoğlu, Haluk Cecan, Hatice Kübra Erişir, Hilal-Ayhan Taşkıran, Hyesung Lee, İnci Larsen, Kadri Kaya, Kemal Çalışkan, Kenan Çizer, Mehmet Aksoy, Mehmet Sümbeli, Meral-Cemal Erez, Metin Benek, Metin Eloğlu, Mustafa Rüçhan, Muhittin Karakuş, Mustafa Sevinç, Muzaffer Akyol, Naile Cimit, Nazım Timuroğlu, Nedim Gündür, Nejat Çınar, Nena-Kemal Çetinel, Nil Gürler, Nurettin Belikırık, Olcay Kıncay, Orhan Oruk, Orhan Peker, Önder Aksoy, Özgü-Ekrem Aydar, Özcan Tunç, Özkan Tarhan, Rabia-Uğur Çalışkan, Sabriye Çelik Uğuz, Sadık Karamustafa, Sakine Özkan, Semih Poroy, Sencer Gülün, Serhat Öztürk, Sibel Sümer, Soloup, Suna Tüfekçibaşı, Şebnem Altuntaş, Şevket Koca, Taner Kalkan, Teoman Madra, Teoman Manacıoğlu, Tevfik Başaran Sirkeci, Tuğba Aksezmener, Tulya Madra, Tunca Subaşı, Turgut Alp Can, Türkan Gündoğdular, Ulviye Baykal Kılıç, Vahit Basmacıoğlu, Yıldırım Alp, Yücel Kurşun, Yüksel Erdoğan, Zeki Kobak, Zeynep Başkurt.*
- ***Art Consultant, Critic, Curator, Entrepreneur:*** *Beral Madra, Cemil İpekçi, Defne Koryürek, Hasan Hüseyin Gül, Kenan Öztürk, Melisa Sabancı Tapan, Öykü Güneş, Selçuk Kaltalıoğlu, Şerif Kaynar, Vassıf Kortun.*
- ***Music Artists (Instructor, Conductor, Composer and Singer):*** *Ahmet Ali Aslan, Ali Darmar, Ayla Erduran, Ayşe Öktener, Ayşegül Yordam, Çağrı Çalışır, Erdim Sertoğlu, Ergün Tekincan, Filiz Ali, Gönül Tuna, Hatice Hilal Ak, İlhan Usmanbaş, Kamuran Gündemir, Mesut Duran, Mesut Yün, Nejat Yavaşoğulları, Selda Yankın, Serdar Ataşer, Yalın, Volkan Güleç, Yavuz Bingöl.*

In addition to many cultural people who contribute to the culture-art life of Ayvalık, there are 122 literary person, 80 theater, dance, music, cinema artists, and 20 applied artists who have lived/are living in the city by producing artistic productions. Following in the footsteps of Orhan Peker, who carried Turkish painting to universal dimensions and admired the naturalness of Ayvalık and produced original works in this city, 118 visual/plastic artists and more than 40 artist workshops (workshops/home-workshops) remind visitors of the artistic trace and provide an artistic experience. At the same time, art houses (residence, studio, initiative), art galleries, art academies, art associations and touristic businesses (coffeehouse, cafe, bar, bistro, restaurant, guesthouse, mansion, guesthouse, boutique hotel) that organize events such as art-themed talks,

Received: 05.06.2025 Accepted: 04.08.2025 Published:29.08.2025

workshops, exhibitions, and art squares, graffiti, which is the symbol of street art, create an art-filled atmosphere for both locals and tourists. Many events, from music to literature, from talks to visual/plastic arts, from theater to dance and cinema screenings, from workshops to festivals, are offered to art viewer/audiences in the district. Ayvalık's culture- art inventory in terms of cultural tourism and art tourism is presented in Table 1.

Table 1. Ayvalık's Culture-Art Inventory in Terms of Cultural Tourism and Art Tourism

Source Values	Ayvalık
Heritage Sites and Attractions: • Castles, bridges, mansions, ancient monuments (ruins, ruins, archaeological sites) etc. • Museums and historical centers • Historical squares and streets • Historical gardens and landscape gardens	***Classical-Hellenistic-Roman-Byzantine-Ottoman Period Settlement and Historical Remains:** Architectural remains, ceramic findings and religious structures (monasteries, churches, chapels) on the coastline, rural areas and islands, commercial and industrial structures (lighthouses, olive and olive workshops/factories, windmills, agricultural terraces, salt pan structures and ancient quarries) and examples of Ottoman Period Greek civil architecture* ***2325 registered structures (monuments & civil architecture examples):** 6 ancient settlements, 3 fortified ancient settlements and 1 watchtower,* ***Nesos/Pordoselene settlement** (below Cunda Duba Mevkii, 2400 years old Classical-Hellenistic-Roman ancient settlement traces),* ***Ayvalık Academy (1803):** Ayvalık Müttelip School and Workshop (Ayvalık Cumhuriyet Primary School)* ***Consulate buildings and stone houses*** ***Yorgolo Han-Municipality Building** (award-winning building by the Historical Cities Union)* ***Despina House-Ayvalık Girls' Vocational High School Historical Building** (Evening Girls' Art School, Girls' Art School, Girls' Institute, Vocational and Technical Anatolian High School)* ***Cunda's Historical Girls' School** (Alibey Cultural Center and Bekir Coşkun Library)* ***Museums:** Cunda Sevim and Necdet Kent Library, Cunda Rahmi M. Koç Museum, Kürşat Ayvalık Olive Oil Industry Museum, Ayvalık Rahmi M. Koç Museum, Taksiyarhis Memorial Museum, Ayvalık Anatolian Civilizations Exhibition, Küçükköy Migration Museum, Ayvalık Municipality Olive Museum and Gallery* ***Historical Squares and Streets:** At Arabacılar Square, Cumhuriyet Square (Atatürk Statue and First Bullet Monument), Cunda Square. Custom Square, Macaron Area (Mercanköşk), Palabahçe Square, (Paleo, Palio Baktshe-Old Garden), Dr. Fazıl Doğan Square, 13 Nisan Main Street (İzmir Road, Ayazment/Altınova Main Street)* ***Turkey's first Bosphorus bridge:** Between Cunda Island and Dolap Island* ***Gönül Road:** Between Ayvalık and Lale Island*
Historical Events and Famous People:	***Atatürk's Visit to Ayvalık** (Atatürk's arrival in Ayvalık on April 13, 1934)* ***The First Bullet Fired at the Enemy in the National Struggle in Ayvalık*** ***The Liberation of Ayvalık from Enemy Occupation***

Received: 05.06.2025 Accepted: 04.08.2025 Published:29.08.2025

	**** The Liberation of Altınova from Enemy Occupation and the Great Republic March Torchlight Procession*** ****Ali Çetinkaya, Zarbalı Hulusi Bey (A. Hulusi Zarplı), Dr. Fazıl Doğan*** ****The 1821 Rebellion, the 1844 and 1944 Earthquake***
Local People and Traditions: • Ethnic groups and Minority cultures • Customs, traditions and customs	****Refugees or Islanders:*** *Those who migrated from the Balkans and Crete, Lesbos (Lesbos, Crete and Western Thrace Culture),* **Sowing and planting operations on solstices* **Hıdırellez, Kermes celebrations* **Social practices and rituals related to birth, wedding and death*
Language: • Local and Minority languages • Language schools	****Ottoman Turkish Summer School*** *(established under Cunda/Harvard University)*
Faith Centers: • Temples, cathedrals • Monasteries, churches and chapels • Mosques, tombs and cemeteries	****13 Churches, 26 Chapels, 10 Monasteries*** ****Mosques and Tombs:*** *Çınarlı Mosque, Saatli Mosque, Hayrettin Paşa Mosque, Hamidiye Mosque (the only mosque built during the Ottoman period), Hacı Bayram Veli Mosque, Çamlık Martyrs Mosque (Çamlık Tepe), Beş Yatırlar Tomb*
Rural Areas: • Islands • Villages • Farms • National parks and other protected areas	****Ayvalık Islands (Hekatonnesoi/ Hundred Islands/ Apollon Hekatos):*** *22 islands – the largest is Alibey Island (Cunda-Moskhonisi), Lale Island (Dolap, Soğan-Krommydonisi) is two islands with residences.* ****3 Greek Villages: Cunda Island Pateriça Locality*** ****Küçükköy Art & Bosnian Village (Yeniçarohori)*** ****Kozak Plateau-Green and Authentic Villages:*** *Olive, grape, pistachio, a wide variety of agricultural products, archaeological remains)* ****Farms Focused on Agriculture, Art and Tourism:*** *Gökada Farm, Sural Farm (Altınova), Leone Natural (Küçükköy), Simlarda Country Club, Mira Farm House (Murateli)* ****Protected Areas:*** *Ayvalık Islands Nature Park, Sarımsaklı Nature Park, Devil's Table Local Wetland and Karakoç Stream Local Wetland (Rich flora and fauna, cultural heritage values)*
Gastronomy: • Traditional Food and Drinks • Local Cuisine • Cooking Classes • Olive Oil Tasting • Wine Making and Wine Tasting • Local Product Rituals	****Food Culture in Ayvalık:*** *It is a synthesis of Cretan, Midilli, Thessaloniki and Balkan cuisines* ****Ayvalık Flavors:*** *Ayvalık toast, papalina, curd dessert, curd cookies, Kirli Hanım cheese, Sepet/Kelle cheese, Cretan roasted chickpeas, Cretan appetizers, Kozak grapes, mastic coffee, mastic ice cream, mastic cookies, grape juice, black mulberry juice, chickpea and simit bread, sage, lokma dessert, rusk and pistachio halva (Bağyüzü village), Cunda beer, herbs such as chicory, tangle, nettle, istifno, Arnavutoğlu yogurt* ****Seafood*** *(sea bream, bream, dentex, papalina, sprat, red mullet, sea bass, gopez, coral, bluefish, calamari, octopus, shrimp, blackthorn, akivades, quince, etc.)* ****Olive Oil Dishes*** ****Appetizers*** *(herb, cheese, olive)* ****Geographically Indicated Products:*** *Ayvalık Blackthorn (2024), Ayvalık Kelle Cheese/Ayvalık Basket Cheese (2024), Ayvalık Mastic Cookie (2023), Ayvalık Curd Dessert (2022), Edremit Gulf Green Scratched Olives (Ayvalık, Burhaniye, Edremit, Gömeç and Havran) (2015) Ayvalık Olive Oil (2007)* ****Products in the Registration Process:*** *Ayvalık Kirli Hanım Cheese* ****Slow Food Product:*** *Ayvalık Kirli Hanım Cheese*

Received: 05.06.2025 *Accepted: 04.08.2025* *Published:29.08.2025*

	***Olive Meetings and Festivals:** Olive oil tasting, olive oil cooking and olive setting workshops, olive oil soap making workshops* ***Independence Day:** Celebration held at the end of the olive harvest* ***Olive Festival:** First celebrated on November 15, 1943) and Olive Growers' Song* ***Kozak Grape Harvest and Auction:** Harvest, auction and wine making (Bağyüzüköyü)*
Modern Culture: • Movies and Music • Local TV, Radio • Newspaper, Blog, Library • Theme, Cultural Parks and Centers • Shopping and Fashion • Technology and Media	***43 films and 11 series shot in whole or in part in Ayvalık*** ***Kırlangıç Olive Oil Factory-Kırlangıç Life Center:** Ayvalık Anatolian Civilizations Museum and Exhibition, stores, art workshops, public spaces* ***Necmi Komili Primary School/Küçükköy** (Garden and playgrounds with permaculture principles and workshops)* ***Boğaziçi Ayvalık Schools*** ***Sabancı University Creative Technologies Workshop and Ayvalık Summer School** (art, ecology and technology workshops)/Küçükköy* ***Ayvalık District Public Library*** ***Hezarfen Ayvalık Library / Ayvalık Bibliography**: A site about Ayvalık's past and future* ***Citizen's Place*** ***Newspaper:** Ayvalık Newspaper, Ayvalık Newspaper Papalina, Ayvalık Newspaper, Ayvalık Magazine, etc.* ***Radio:** Ayvalıkzade Radio, Radio Kuzey Ege (Cunda Agency)*
Themed and Special Interest Trips and Excursion Programs: • Cultural Routes • Routes and Corridors • City Tours • Excursions	*Ayvalık Historical City and Art Tour, Cunda Art Route, Küçükköy Art Route,* *Adramytteion Themed Culture Routes* * Ayvalık Outdoor Activities and Tours (hiking, cycling, motorcycle, camping and caravan etc. tours)* *Sarımsaklı Wetland Bird Watching and Viewing Walking Path* *Ayvalık Olive Route* *Ayvalık Islands Diving Tour, Cultural Tour by Boat (Daily Boat Tour)*
Sports and Leisure Activities: • Participants and spectators • Traditional games and sports • Health centers	***Ayvalık, the City of Sports and the Center of Water Sports:** Turkish Sailing Federation's Sailing League 3rd Leg Races and 2025 Stars Cup, Pergamon O-Week's Ayvalık Stage, Ayvalık J70 Turkey Championship, Ayvalık Golden Fin Underwater Competition Turkey Championship, Ultimate Cunda, Ayvalık Granfondo, Ayvalık Half Marathon-Ayvalık Weekend Sports Event* ***Healthy Life Centers:** Ayvalık Horse Farm, Kozak Yaylası, Simlarda Country Club-Ayvalık Aquapark Children's Entertainment Center*
Festivals, Special Events and Activities: • Folklore • Art and Artists • Performing Arts • Sports and Special Interest Events	***Festival, Celebrations, Festivity and Events** Olive Kernels Summer Concerts, Harvest Run, World Bird Watching Day, Trophy 2021 International Culture and Folk Dance Festival, Ayvalık Women's Dance Festival, Ayvalık Küçükköy Traditional Bosnian Teferiç Festival, Ayvalık Culture and Art Days, Ayvalık International Film Festival, Ayvalık International Music Festival (AIMA), Ayvalık International Theater Festival, Ayvalık International Olive Harvest Festival Ayvalık Flavors Festival, Ayvalık Winter Festival, Ayvalık Sky Observation Festival, Ayvalık Literature Days, Ayvalık GastroFest etc.*
	Olive Culture:** Approximately 2,000,000 olive trees and 81 Monuments, Monumental and Olive Trees Worth Preserving and 22 Oil Plants (Olive Oil Factories),* ***60 Agricultural Enterprises/Farms

Received: 05.06.2025 *Accepted: 04.08.2025* *Published:29.08.2025*

Agriculture, Industry and Trade: • Business and factory visits • Mines • Agricultural attractions • Artistic attractions • Tourist attractions • Famous stores and shopping malls • Bazaars and markets • Leisure shopping	***Agriculture and Tourism Unity:** Kürşat Olive House and Museum, Mehmet Akyalı Olive Oil Factory-Trip Area, Good Life Academy, Özgün Academy, Cunda Aşiyan, Zarbalı Ayvalık, ZOI Cunda, Ayvalıkzade, Mutluköy Nostalgia,* ***20 Windmills, 3 Tuzla, 2 Lighthouses, Agricultural Terraces, Pens and Farms on 12 Islands*** ***2 Antique Quarries:** Badavut Quarry and Dolap (Lale/Soğan) antique quarry (in pool form)* ***Iron, gold mines and ornamental stones** (Altınova quarry / chalcedony, agate, heliotrope and opals).* **7 **Local Markets:** The most famous are Thursday Market (Aromatic and Medicinal Plants Festival) and Cunda Market* ***Special Day Market Area:** Gri Alan (Art & Design Market), Küçükhan Ayvalık, Devil's Coffee (New Year's Market, 8 March Market etc.)* ***Markets and Passages:** Ayvalık Market (Historical Vegetable and Fruit Market-Bedesten), Historical Antique Dealers' Market/Eminzade Business Center ('Time Travel' Antique Dealer Deniz Arbak and Collector Bilge Yılmaz with antique and collection information event), Antique Dealers' Street-Antique Market, Tenekeciler Market (Meyhaneler Street), Yeniçarohori Antique Art, Süner Passage,* ***Historical Inns:** Georgala (Yorgola) Inn (Old Tax Office/ Ayvalık Municipality Service Building), Jewish Inn (close to Devil's Coffee)* ***Coffeehouse and Grocery Store:** Devil's Coffee, Camlı Coffee, Mercan's Coffee (Ayvalık Macaron), Artisan Grocer, Cunda Stone Coffee, Cunda Grocer, Faik'Soda Man* ***Historical Bakeries and Clubs:** Güler Dessert House (1942), İmren Bakery (1946), City Club, Macaron Bakery- Muhallebicisi, Cumhuriyet Bakery (Cunda), Karadeniz Bakery (Cunda), Bilir Brothers Bakery* ***Second-hand bookseller and Bookstores:** AHTO Bookstore, Çiçek Second-Hand Bookseller (second-hand bookseller Meetings with Can Ceylan), Eflatun Book-Kahve, Eski'z Bookstore, Evin Bookstore, Geylan Bookstore* ***Thematic Businesses:** Cafes, bars and taverns, boutiques, hotels and tradesmen's restaurants.*
Sanatlar: • **Sanatçı kişiler ve sanat olayları** • **Tiyatrolar, konser salonları, kültür merkezleri, sanat akademileri** • **Sanat kurumları (galeriler, vakıflar, müzeler ve akademiler)** • **Sanat ve Sanatçı atölyeleri,** • **Sanat Evleri (rezidans, stüdyo)** • **Kültürel Sergiler**	***The rich intellectual life in Ayvalık:** The existence of many writers, poets, filmmakers, theater artists, musicians, visual artists, art critics and curators who lived/live in the district,* ***"City Center Art" Program:** Prepared and presented by Turgut Baygın, Program consultant Selçuk Kaltalıoğlu, Director Nail Pehlivan* ***Music in Ayvalık*** *-Gerard Digenis Music School, Arion and Orphee Music Associations (from the 1896-97 and 1898 editions of the Eastern Trade Yearbooks)* *-Three music cafes- Cafes Shantant (with theater performances) (Eastern Trade Yearbooks, 1890 edition)* *-World-famous musician Kamuran Gündemir* *-Ayvalık Band (Ayvalık Municipality Band): The band starts with the "Mavi Yıldırım" play at the People's House founded by Dr. Fazıl Doğan in 1936. In 1937, it was established as the Ayvalık Municipality Band by Mayor Hasan Basri Akın. Between 1951-2019, Bandmaster Ergün Tekincan*

Received: 05.06.2025 Accepted: 04.08.2025 Published:29.08.2025

	-Music and Dance Ensembles: Ayvalık Karagöz Roman Orchestra, Ayvalık Rebetiko Ensemble, Ayvalık Cretan Association Population Exchange Choir, Ayvalık Kdonia Polyphonic (Kdonia Polyphonic Ayvalık Music Ensemble), AHSÖMDER- Turkish Classical Music Choir, Ayvalık One Sea Two Collars Arm in Arm "..Dances and Songs of the Same Seas..", Dance Aivali, Azulmavi Flamenco Ayvalık, Ayvalık Dance Workshop, Danshane Ayvalık, Feel The Beat Drum Camp (Marlo Ayvalık). ***Theatre in Ayvalık*** *-Ayvalık Turkish Hearth, Ayvalık Sports Dormitory-Representation Branch, Ayvalık Teachers' Union, Ayvalık "Okutanları", Ayvalık People's House-Representation Branch and later on, Performance Branch, theater works and shows belonging to schools* *- Ayvalık Municipality Theater, Art Factory, TiyatrODA Group, Ercan Kubaş Art Theater* ***Culture and Arts Centers/Areas:** Alibey Cumhuriyet Culture Center (Bekir Coşkun Library), ASKEV- Greenhouse (Event Area, Botanical Garden, Library, Melin Cafe), Ayvalık Amphitheater, Ayvalık Municipality 19 Mayıs Cihan Şişman Youth Center, Ayvalıkevi, Ayvalık International Music Academy (AIMA)- Haluk Barutçuoğlu House, ÇYDD Fahamet-Ali Kemal Sabuncugil Education House, FA- Fabrika Ayvalık/Ayvalık Art Factory, Gri Alan Ayvalık (Independent Art Area), İsmet İnönü Culture Center, KıraArthane (digital art center), Küçükköy Culture Center, KüçükHan Ayvalık, Muhip Özyiğit Culture and Arts Center, Mutluköy Life Center (educational and social event venue in cooperation with MEB-Komili), Palabahçe Square (Film Set), Prof. Dr. Türkan Saylan Cultural Center, Sabancı University Creative Technologies Workshop and Ayvalık Summer School (art, ecology and technology workshops), Devil's Coffee, Vural Cinema Nejat Uygur Stage* ***Culture and Art Civil Society Organizations:** Ayvalık Culture and Art Association (AYKÜSAD), Ayvalık Art Association (ASD), Ayvalık Culture and Art Foundation (AKSV), Ayvalık Art Culture and Education Foundation (ASKEV), Ayvada Art Center Association (AYSAM), Olive Kernels Association, Support Design Academy – Art and Education Support Association, Ayvalık One Sea Two Columns Arm in Arm "..Dances and Songs of the Same Seas.." Culture and Art Association, Ayvalık Ayazma Association, Ayvalık Art and Handicrafts Association (ASED), Anatolian Arts Kadir Ünlü Music Association (ASKÜD), Ayvalık Art Community Association (AYSAT), Ayvalık Mesut Duran Music Association, Ayvalık Music Association, Ayvalık History Research Art Education Association, Gönül Tuna Music, Culture and Art Association, Altınova Culture Art Tourism Promotion and Development Association, Ayvalık City Studies Association, Ayvalık Gastronomy and Cooking Association etc.* ***Museum and Gallery:** Atelier Art Center-Galeri Su, Artura Gallery (Xylogrophy Museum), Atelier Baykuş, Barkhan Museum/Gallery, GalerIda, Kapkarga Art Gallery, Karagöz Art Gallery, Kydonies Art Gallery (Ali Ege Art Gallery), Küçükköy City Museum and Art Gallery, Olgay Art House and Gallery, Orhan Peker Art Gallery, Şevket Koca Art Gallery & Studio* ***Artists' Workshops, Art Houses and Artistic Activities:** Ahmet Yorulmaz House, Adra Academy-Art Workshop, Atelier Adatepe, Atelier Ayvada, Atelier Bovindo, Atelier Ida, Atelier Happy heArt,*

Received: 05.06.2025 Accepted: 04.08.2025 Published:29.08.2025

	Ayvalık, Boğaziçi Ayvalık Schools (art workshops in partnership with Olive Kernels Association and Boğaziçi University), Barbara Residency, Bedri Karayağmurlar Painting Workshop, Botanical Academy, Support Design Academy (Turgay Gönenç Cinema Library, art gallery, art workshop, art shop and cafe), Emine Boyner-Atelier Patika, Fikret Mualla House, Gate 27 Guest Artist Program (Artist Residency), Hakan Urul Workshop, Karagöz Art House, Santimetre Studio Martch Art Studio, Mutluköy Guesthouse, Mustafa Rüçhan House, Oktay Ekinci Cartoon House- Ayvalık Bookstore, Orhan Peker Workshop (Şevket Osman Karaca House), Özgü-Ekrem Aydar Painting Workshop, Yer Ayvalık Guest Artist Program, ZeliCunda and Çiğdem Celasin, Moka, Yasemin Atasel, Deep Art Ceramics Workshops.
Traditional Handicrafts: • Local handicrafts • Local souvenirs	*Cretan Blanket (produced by KEDİ) *Atelier Latif, Atelier Patika, Bilart Art House, Stone Shop Art House, Miniature Atelier, Mehmet Karaaslan Çini Atelier, Artura Art Craft, Atelier Kuca, Kechevi etc. *Olive oil cosmetics and cleaning products and olive themed gift products
Architectural Style and Diversity:	**Historical houses in neoclassical style (Stone/Greek houses) and narrow streets*
Cultural Landscapes: • Rural and urban cultural landscapes • Observation terraces • Panoramic viewpoints	**Asar Hill/Çamoba village, Maden Hill/Büyük Maden Island* **Heaven Hill, First Bullet Hill (Profitilya)* **Lovers Hill, Cunda Fahrisin Hill, Pınarboğazı Viewing Terrace* **Devil's Table, Timarhane Island, Bunny Ears Hill, Çamlık Hill* **Altınova Aktepe*

Source: Compiled from various sources.

Evaluation of Cultural And Art Tourism In Ayvalik Through Swot Analysis

In this study, Ayvalık's cultural and artistic inventory (Table 1) is used as a basis to conduct a SWOT analysis (strengths, weaknesses, opportunities, and threats) in terms of cultural and art tourism. The findings obtained from the analysis are presented in Table 2.

Table 2. SWOT Analysis of Ayvalık in Terms of Culture and Art Tourism

STRENGTHS	***WEAKNESSES***
• Possession of geographical attractions (suitable climate comfort, fertile soils, blue coasts and coves, ease of transportation and availability of alternative transport options), *• The richness of natural, cultural, and archaeological values of the Ayvalık Islands (Hekatonnesoi) and the Ayvalık Islands Nature Park,* *• A high number of Blue Flag awards (21 Blue Flag beaches / total of 49 in Balıkesir, 1 Blue Flag marina, 3 Blue Flag yachts) (TÜRÇEV, 2024),* *• Presence of 5 urban and 13 archaeological protected areas, and 2,325 registered buildings (including monumental structures and civil architecture),*	*• Lack of destination management,* *• Inadequate infrastructure and service quality,* *• Insufficient promotion and marketing,* *•Festivals and events taking place only on a local scale,* *• Seasonality and overcrowding issues due to second homes and domestic tourism,* *•Infrastructure, roads, parking, water, waste, electricity, security, and environmental pollution problems caused by exceeding physical carrying capacity during summer months,*

Received: 05.06.2025 Accepted: 04.08.2025 Published:29.08.2025

• More than 100 individuals involved in culture, including 122 literary figures; 118 visual/plastic artists; 80 performing artists (theatre, dance, music, cinema); and 20 applied arts practitioners, • Over 40 artist workshops (including home-based studios), 13 art museums/galleries and houses, and 18 culture and arts centers, • Progress toward becoming an "Art Destination", • Presence of olive culture, which is also the most important livelihood source, • Cultural influences from Lesbos (Midilli), Crete, and the Balkans, • Rich variety of local products leading to a diverse cuisine (mezes featuring seafood, herbs, cheese, olives, and olive oil), • Existence of 60 agricultural enterprises/farms, • Local markets (most famous being Ayvalık Thursday Market), • Organization of more than 30 festivals, celebrations, and events in various fields, • The district attracting the most tourists in the province (According to 2022 accommodation data compared to Edremit Bay and the entire Balıkesir region, Ayvalık was the most visited district with 370,429 tourists) (Çelik-Uğuz & Karakaş, 2023: 191), • Availability of 424 accommodation facilities (with a total of 21,253 beds): (8 facilities with Investment Certificate / 170 beds, 26 facilities with Tourism Operation Certificate / 3,452 beds, 378 facilities with Municipal Certificate / 14,637 beds, and 12 public-private campsites with Municipal Certificate / 2,994 beds) (Çelik-Uğuz & Karakaş, 2023: 190), • Presence of 20 A-group and 1 C-group travel agencies, • Existence of 20 camping and caravan areas (Çelik-Uğuz & Karakaş, 2021: 1641–1642), • 57 daily excursion boats with Tourism Operation Certificate (with a total capacity of 4,122 people), • Having 60 diving spots and year-round diving opportunities, making it a major attraction center, • Presence of 4 diving schools, • No significant safety or security concerns for domestic and international visitors.	• Lack of representation and ineffective operation of tourism associations established through public-private partnerships, • Very slow progress in both the registration of cultural assets and the restoration of registered buildings to give them a new identity, • Lack of Eco-Agro and Eco-Art tourism; only 7 agricultural enterprises have ties to art and tourism, • Inability to implement a holistic tourism approach that combines nature, culture, art, and education-based tourism types, •Budget shortages in local governments for transforming idle architectural structures into art institutions, •Low number of products with registered geographical indication, • Existence of approximately 41,000 second homes, •Being a destination predominantly preferred by domestic tourists (Out of the total 370,429 tourists who visited Ayvalık in 2022, 49,642 were foreign nationals, and 195,487 were domestic visitors) (Çelik-Uğuz & Karakaş, 2023: 191), •Low occupancy rates of facilities (Between 2010–2022, the average occupancy rate of accommodation facilities with a Tourism Operation Certificate in Ayvalık was 43.32%. This rate was 39.07% in the Edremit Gulf and 37.28% in Balıkesir. For facilities with a Municipal Certificate, the occupancy rate was 28.94% in Ayvalık, 30.81% in Edremit Gulf, and 31.86% in Balıkesir) (Çelik-Uğuz & Karakaş, 2023: 193), • Short average length of stay (In 2022, the average stay in both Tourism Operation Certified and Municipal Certified facilities was 2.3 nights) (Çelik-Uğuz & Karakaş, 2023: 192).
OPPORTUNITIES	***THREATS***
• Having a strong image in the Northern Aegean region, • Increasing interest in cultural tourism, particularly art tourism, • Ayvalık's potential to lead the process of becoming an "Art Corridor" within the Edremit Gulf, • The adaptability of the new 3S tourism trend that emerged after the COVID-19 pandemic—slow, small, smart—to cultural and art tourism,	• Increasing competition in Northern Aegean tourism, • Infrastructure deficiencies compared to some national and regional destinations, • Cultural assets not being addressed within a comprehensive project framework (in terms of permits, financing, and administrative approvals), • Time delays in restoration projects due to prolonged formalities and/or overly detailed reviews by administrative units, and delayed issuance of permits and construction licenses,

Received: 05.06.2025 Accepted: 04.08.2025 Published:29.08.2025

• *Cultural heritage elements and artistic events offering alternative experiences for innovative tourists,* • *Possibility of conducting cultural tourism and its subtypes in all four seasons,* • *Local community's belief in Ayvalık's development through culture and art, and a high level of awareness in cultural tourism,* • *Active involvement and efforts of central and local governments, educational institutions, and NGOs in the fields of culture, art, and tourism,* • *The contribution of tourism—especially cultural tourism—to the district's socio-cultural and economic development,* • *Ayvalık ranking first among Balıkesir districts in terms of destination brand personality based on Wikipedia content (Özgürel, Kesgin & Avcıkurt),* • *Membership in the Union of Historical Towns (Tarihi Kentler Birliği),* • *Inclusion of the "Ayvalık Industrial Landscape" on the UNESCO World Heritage Tentative List in 2017,* • *Presence of the Ida-Madra Geopark as part of the ongoing UNESCO process,* • *Availability of research, studies, and projects in the fields of culture and tourism,* • *Possession of a rich and distinctive exchange-based (mübadil) culinary heritage,* • *Presence of natural conservation and protected areas,* • *Restoration of old buildings such as historical houses, soap factories, and olive oil mills to be repurposed as art studios, boutique hotels, restaurants, cafes, and souvenir shops.*	• *Degradation of architectural texture and/or cultural landscape,* • *Emergence of new issues as a result of exceeding physical, social, economic, and ecological carrying capacities,* • *Licensing, rent, and workplace-related challenges faced by small-scale culture, art, and tourism businesses,* • *Global uncertainties and crises in health, climate, economy, and politics,* • *Local residents not adequately benefiting from the social and cultural environment provided by tourism or from tourism-generated income,* • *Lack of reorganization by local governments in terms of service delivery for historical settlements (old city/old town), such as street improvements, nostalgic lighting, or smaller fire and garbage trucks,* • *Creation of an unplanned and temporary destination image through overly popular tourism projects,* • *Failure to restore privately owned, registered historical buildings in old settlements in accordance with their original form, along with the spread of nepotism,* • *Some registered historical buildings in old settlements—such as churches, inns, baths, and buildings with significant historical narratives—still remaining unrestored.*

4. CONCLUSION AND RECOMMENDATIONS

Ayvalık possesses significant socio-economic potential due to its demographic structure, agricultural strength, historical and cultural fabric, architectural diversity, artistic identity, and tourism appeal. With its archaeological findings, religious and civil architectural monuments, and commercial and industrial structures, Ayvalık is a prominent cultural heritage site encompassing both ancient and recent periods. The district stands out with its industrial buildings such as olive oil factories, soap houses, oil presses, and commercial warehouses—structures related to olive cultivation and production, a key local trade. The presence of olive processing plants/factories, lighthouses, windmills, agricultural terraces, salt pans, and quarries contribute to Ayvalık's industrial heritage attractions.

Received: 05.06.2025 Accepted: 04.08.2025 Published:29.08.2025

Recognized for its cultural and artistic profile, Ayvalık is a strong candidate to become the "cultural capital" and an “art destination” of the region. As a unique, original, and emerging art destination, it serves as an alternative tourism hub and a center of attraction for both artists and tourists. The goal should be to transform this growing interest into tourism activity by offering tourists distinctive and memorable experiences through art, and to reinforce the destination image of Ayvalık through the sharing and storytelling of these experiences.

To achieve these goals, the following actionable and sustainable recommendations are proposed:

• Ayvalık should make greater use of the power of culture and art, which form the core of its urban identity.

• The future vision of Ayvalık—particularly in tourism—must be rooted in art.

• Tourism in Ayvalık should rapidly evolve under the scope of cultural tourism, with a particular focus on art tourism and creative tourism. A corresponding tourism strategy should be developed.

• Art routes should be designed in collaboration with travel agencies and tour guides, and art tours should be organized to attract more “art tourists.”

• Ayvalık should expand its artistic activities to become the cultural and artistic hub—if not the “art capital”—of the Northern Aegean, attracting both domestic and international tourists for this purpose.

• Idle architectural monuments should be transformed into new and functional spaces such as museums, galleries, theaters, cabarets, symphony or opera houses, and tourism-related businesses. These venues can then be used for cultural and artistic purposes, such as painting and sculpture exhibitions.

• Local partnerships, stakeholder collaborations, and community participation must be strengthened in the field of culture and the arts, in line with sustainable development goals.

• The potential benefits of cultural and art tourism—such as increasing visitor numbers, length of stay, tourist spending, and ensuring fair income distribution—should be communicated to local residents through an action plan.

Received: 05.06.2025 *Accepted: 04.08.2025* *Published:29.08.2025*

• A “Destination Management Organization” (DMO) should be established in Ayvalık with the aim of developing and promoting the image of “Ayvalık: The Art Destination,” serving as a model for other local governments.

Ensuring sustainable tourism development in destinations like Ayvalık is the fundamental responsibility of local tourism stakeholders and especially destination management authorities. In other words, strategic planning and implementation should be carried out by these management organizations. For Ayvalık, there is an urgent need for a destination management body capable of making and executing strategic decisions regarding regional tourism planning, marketing, and branding. Such organizations operate within a strategic framework to assess and manage the region’s carrying capacities—economic, social, ecological, and beyond. For tourism in Ayvalık to be sustainable, the establishment of a DMO and the creation of a strategic tourism plan are essential. The primary mission of this management body should be to prioritize and implement a "Growing with Art" project in collaboration with local stakeholders.

REFERENCES

ADRA (2024). Adramytteion Antik Kenti ve Egemenlik Alan, Edremit Körfezi Güney Sahası Arkeolojik Yüzey Araştırmaları Arşivi, Kültür Envanteri Listesi 2024.

Akın, B. (2015). Ayvalık Evleri’nin Cephe Karakterinin Oluşumuna Etki Eden Faktörlerin Değerlendirilmesi, Sanat Tarihi Dergisi XXIV (2): 121-138.

BKVKBK, (2022). Balıkesir Kültür Varlıklarını Koruma Bölge Kurulu Müdürlüğü, Taşınmaz Kültür Varlıkları ve Sit Alanları Envanter Listesi, 2022, https://korumakurullari.ktb.gov.tr/Eklenti/102741,balikesir-envanterpdf.pdf?0

Bonet, L. (2003). Cultural Tourism, In: Towse, R. (ed), A Handbook of Cultural Economics, Cheltenham-UK-Edward Elga Publishing Inc., pp.187-193.

Cheirchanteri, G. (2019). Industrial Cultural Heritage as an Alternative Tourism Model: Case study of the Wider Lavreotiki area inSoutheastern Attica WMCAUS 2019, IOP Publishing Series: Materials Science and Engineering, 1-9.

Çelik-Uğuz, S. (2020). Ayvalik an as Art Route for Tourism Guides within the Frame of Art Tourism, Cases on Tour Guide Practices for Alternative Tourism, Eds. Gulsun Yıldırım, Ozlem Ozbek, Ceyhun Caglar Kılınc and Abdullah Tarınc, June 2020, Chapter 13, pp. 240-256, IGI GLOBAL, USA: Hershey PA, 2020, ISBN13: 9781799837251.

Received: 05.06.2025 *Accepted: 04.08.2025* *Published:29.08.2025*

Çelik-Uğuz, S., Karakaş, M. (2021). Alternatif Turizm Türü Olarak Kamp ve Karavan Turizmi: Edremit Körfezi'nde Bir Değerlendirme, 21. Ulusal Turizm Kongresi (UTK20) ve 5. Uluslararası Turizm Kongresi, 15-17 Ekim 2021, (Online sunum), İç Turizm konulu Tam Metin Bildiri Kitabı, Aralık 2021, ss. 1636-1648, ISBN: 978-605-254-505-8.

Çelik-Uğuz, S. ve Karakaş, M. (2023). Ayvalık Turizminin Arz ve Talep Boyutu İle İncelenmesi, FAREAST 1st International Conference On Social Sciences, July 2-6, 2023, Hanoi, Vietnam, Conference Book, 30.07.2023, ss. 183-196, Academy Global Publishing House, ISBN: 978-625-6830-03-5.

Efe, R., Soykan, A., Cürebal, İ., Sönmez, S. (2013). Edremit Yöresi Yağhaneleri: Geçmişten Günümüze Zeytin, Zeytinyağı ve Sabun Sanayii, Ana Gıda Yayınevi.

Efe, R., Soykan, A., Cürebal, İ. Ve Sönmez, S. (2016). Balıkesir'deki Yöresel ve Geleneksel Ürünlere Coğrafi Bir Yaklaşım. Balıkesir 2. Kent Sempozyumu, 20-22 Kasım 2015, Balıkesir, Bildiriler Kitabı, ss. 129-154.

Gökdeniz, A. (2019) Ayvalık Stratejik Turizm Planı (2019-2023) Ve Destinasyon Yönetim Örgütü Modeli, Detay Yayıncılık, Ankara, S.14.

Gökdeniz A., (2017), "UNESCO Süreçleri ve Bir Başar Hikayesi "Ayvalık Endüstriyel Peyzaj" Başlığı İle Geçici Liste'de (Tentative List)", Uluslararası Sosyal ve Ekonomik Bilimler Dergisi (International Journal of Social and Economic Sciences), Doi: www.nobel.gen.tr, 7(1), 26-33.

Hughes, H.L. (2002). Culture and tourism: A framework for further analysis. Managing Leisure, 7(3), 164-175.

Özgen, H.M. (2022). Güncel Kültür Envanterinin Kamusal Planlama Süreçlerindeki Önemi: "Adramytteion (Ören) Ve Körfez Güney Sahası (Burhaniye-Gömeç-Ayvalık)" Örneği, Balıkesir Arkeoloji Buluşmaları Sempozyumu Mysia Ve Çevre Kültürleri 2021, 7-9 Ekim 2021 Balıkesir, Tam Metin Bildiriler Kitabı, Ege Yayınları, Kasım 2022 ss. 17-44.

Özgürel, D., Kesgin, M., & Avcıkurt, C. (2022). Bir destinasyon olarak Balıkesir ilinin marka kişiliği: Vikipedi içeriklerinin analizi [Brand personality of Balıkesir province as a destination: Analysis of Wikipedia contents]. In L. Altinay, O. M. Karatepe, & M. Tuna (Eds.), *Daha iyi bir dünya için turizm* (Vol 2, pp. 1–13). USF M3 Publishing. https://www.doi.org/10.5038/9781955833103

Received: 05.06.2025 *Accepted: 04.08.2025* *Published:29.08.2025*

Prentice, R.C. (1989a). Visitors to Heritage Sites: A Market Segmentation by Visitor Characteristics. In: D. T. Herbert, R. C. Prentice, and C. J. Thomas, eds. *Heritage Sites: Strategies for Marketing and Development*. Aldershot, UK: Avebury, pp. 1–61.

Prentice, R.C. (1989b). Pricing Policy at Heritage Sites: How Much Should Visitors Pay? In: D. T. Herbert, R. C. Prentice, and C. J. Thomas, eds. *Heritage Sites: Strategies for Marketing and Development*. Aldershot, UK: Avebury, pp. 231-271.

Richards, G. (Ed.). (1996). *Cultural Tourism in Europe.* Wallingford: CAB International.

Richards, G. (2001), Cultural Attractions and European Tourism, Wallingford Oxon, UK: CAB International Publishing.

Richards, G. (2007), Global Trends in Cultural Tourism, In:Richards G. (ed), Cultural Tourism: Global and Local Perspectives, Binghamton, NY: Haworth Hospitality Press,1-24.

Richards, G. (2011) Cultural tourism trends in Europe: a context for the development of Cultural Routes. In: Khovanova-Rubicondo, K. (ed.) Impact of European Cultural Routes on SMEs' innovation and competitiveness. Strasbourg: Council of Europe Publishing, pp. 21-39.

Silberberg T. (1995). Cultural tourism and business opportunities for museums and heritage sites. *Tourism Management* **16** (5): 361– 365.

Smith, M.K. (2003). *Issues in cultural tourism studies*. New York, NY: Routledge.

Stebbins, R (1996). 'Cultural Tourism as Serious Leisure' In Annals of Tourism Research 23: 948-950.

Swarbrooke, J. (1999). Sustainable Tourism Management, Wallingford: CABI Publishing.

URL: Ayvalık Belediyesi, https://ayvalik.bel.tr (Accessed: 15.03.2025).

URL: Ayvalık Kaymakamlığı, https://ayvalik.gov.tr (Accessed: 15.03.2025).

URL: Ayvalık'tan Yolu Geçenler, https://yoluayvaliktangecenler.tr.gg/ (Accessed: 15.03.2025).

URL: BKVKBK, (2022). Balıkesir Kültür Varlıklarını Koruma Bölge Kurulu Müdürlüğü, Taşınmaz Kültür Varlıkları ve Sit Alanları Envanter Listesi, 2022, https://korumakurullari.ktb.gov.tr/Eklenti/102741,balikesir-envanterpdf.pdf?0 (Accessed: 15.03.2025).

URL: Hezarfen, Ayvalık'ın dünü ve yarını hakkında bir site, https://kaankoksal.blogspot.com/ (Accessed: 15.03.2025).

URL: Türk Patent ve Marka Kurumu (2024), Coğrafi İşaret ve Geleneksel Ürün Listesi, Balıkesir, https://ci.turkpatent.gov.tr/veri-tabani (Accessed: 15.03.2025).

Received: 05.06.2025 *Accepted: 04.08.2025* *Published:29.08.2025*

URL: Türkiye Çevre Eğitim Vakfı (TÜRÇEV) (2024). Yıllara Göre Mavi Bayrak Sayıları, https://www.turcev.org.tr/v2/icerikDetay.aspx?icerik_id=121, (Accessed: 15.03.2025).

DISCLOSURE OF CONFLICT

The author(s) declare that they have no conflicts of interest.

FORCE: Focus on Research in Contemporary Economics *2025 - Vol:6 No:1*

Received: 05.08.2025 *Accepted: 28.08.2025* *Published:29.08.2025*

MODELING THE GROSS DOMESTIC PRODUCT OF TANZANIA FROM 1960 TO 2023: THE BOX- JENKINS APPROACH

Bahati Ilembo* – Mzumbe University, Tanzania

Mary Mwingira

*Corresponding Author

Email: ilembobahati@gmail.com

ORCID: 0000-0001-5991-2571

Abstract

Gross Domestic Product (GDP) is a crucial indicator of a nation's economic performance, reflecting overall economic activity and guiding policy formulation. Accurate GDP forecasting is essential for economic planning, especially in countries like Tanzania, where external shocks such as the COVID-19 pandemic had significantly influenced economic trends. Despite the importance of GDP forecasting, limited studies have analyzed the effectiveness of time series models in predicting Tanzania's GDP before and after major economic shocks. This study employed the Autoregressive Integrated Moving Average (ARIMA) model to forecast Tanzania's GDP at current prices, comparing pre- and post-COVID-19 trends. The research utilizes historical GDP data from 1960 to 2023, obtained from the World Bank. The Box-Jenkins methodology is applied to identify and validate the best-fitting ARIMA model based on statistical criteria such as AIC, BIC, and RMSE. The findings indicate that the ARIMA (0,2,1) model effectively captured Tanzania's GDP trends, offering reliable short-term forecasts. However, external factors such as inflation, global economic fluctuations, and structural inefficiencies continue to pose challenges to long-term economic stability. The study highlights the significance of integrating time series forecasting into economic decision-making, enabling policymakers to anticipate economic shifts and implement evidence-based strategies.

Keywords: Hybrid Models, ARIMA, Economic Shocks, Forecasting

Received: 05.08.2025 Accepted: 28.08.2025 Published:29.08.2025

1. INTRODUCTION

Gross Domestic Product (GDP) serves as a fundamental measure of a country's economic performance, representing the total market value of all final goods and services produced within a nation over a specific period. GDP is calculated based on the value added at each stage of production, from raw materials to final products, typically assessed on an annual basis (Kira, 2023). A robust GDP growth rate is often associated with economic stability, improved living standards, and sustainable development. However, global and domestic economic shocks significantly influence GDP trends, necessitating accurate forecasting models to guide policy and decision-making (Mankiw, 2020).

During 2019, the global economy has faced multiple disruptions, with the COVID-19 pandemic being one of the most significant in modern history. The pandemic led to widespread lockdowns, trade restrictions, and labor market disruptions, causing a sharp contraction in GDP worldwide. Empirical studies have shown that global GDP contracted by approximately 3.4% in 2020, marking one of the steepest declines in recent decades (Mckibbin & Fernando, 2020). Despite gradual recovery through 2021 and 2022, economic projections remain cautious due to ongoing uncertainties, including geopolitical tensions and inflationary pressures (Mulenga, 2024).

According to the International Monetary Fund (IMF), global GDP growth contracted sharply in 2020 due to widespread lockdowns and disruptions to trade, labor markets, and production chains (IMF, 2023). However, in 2021 and 2022, global economic recovery showed signs of resilience, aided by vaccination rollouts and government stimulus packages. Despite this, projections for future global growth remain modest, with growth expected to be 3.3% in 2025 and steady through 2026 (World Bank, 2023). The recovery process has been uneven, with some regions, particularly advanced economies, showing faster recovery, while developing and emerging markets continue to struggle with high levels of debt and inflation (Bailey et al., 2021).

The African economy, particularly in Sub-Saharan Africa, experienced severe economic setbacks due to the pandemic. Several studies have highlighted that GDP growth in Africa plummeted by 2.1% in 2020, marking the worst economic performance in decades (Adegbite, 2023). According to the United Nations Economic commission for Africa (UNECA),the pandemic caused significant disruptions in trade, tourism, and commodity prices, leading to widespread fiscal stress and a sharp contraction in growth across the continent (UNECA,2021).The

Received: 05.08.2025 Accepted: 28.08.2025 Published:29.08.2025

International Monetary Fund (IMF) and the World Bank both reported that recovery prospects for African economies remain uneven, largely dependent on global economic conditions, access to vaccines, and structural reforms (IMF,2021; World Bank,2021) The pandemic exacerbated existing structural challenges such as poverty, inequality, and weak healthcare systems. While economic recovery efforts led to a modest rebound in 2021 and 2022, scholars argue that the region continues to struggle with external debt, inflation, and global supply chain disruptions (Mbaye & Gueye, 2023).

According to the African Development Bank (AfDB), the pandemic caused a severe economic slowdown, with GDP growth in Africa plummeting by 2.1% in 2020, the worst performance in decades (AfDB, 2021). However, as countries began to adapt, economic activity started recovering in 2021, with the AfDB projecting a rebound to 3.4% growth in 2022. Despite this recovery, many African nations continue to face structural challenges that hinder sustainable growth, including limited access to vaccines, poor infrastructure, and dependency on commodity exports (Agwanda et al., 2021). The recovery remains fragile, especially as inflationary pressures and global economic uncertainties persist.

The East African region with a combined population of over 400 million people was also severely impacted by the pandemic. The region, which relies heavily on agriculture, trade, and services, witnessed a GDP contraction of approximately 1.2% in 2020, particularly due to disruptions in tourism and trade (Muoki, 2023). However, economic recovery has been evident, with projections indicating a gradual return to pre-pandemic growth levels, supported by increased trade activities and investments in infrastructure (Geda, 2024). Nevertheless, challenges such as inflation, fluctuating commodity prices, and reliance on external markets continue to pose risks to sustainable growth (Amenu et al., 2023).

East Africa's GDP contracted by 1.2% in 2020, with tourism, transport, and trade severely impacted (World Bank, 2021). However, recovery in the region has been evident, with projections for 4.5% growth in 2022, led by a resurgence in trade, agriculture, and the mining sectors (United Nations Conference on Trade and Development[UNCTAD], 2021). Despite the regional rebound, East African economies remain vulnerable to global shocks, particularly those related to energy prices and global trade disruptions (Kassegn & Endris, 2021).

In the case of Tanzania, GDP trends have shown fluctuations before and after the COVID-19 pandemic. Prior to 2020, the country's GDP growth averaged around 6.5%, driven primarily by

Received: 05.08.2025 Accepted: 28.08.2025 Published:29.08.2025

agriculture, manufacturing, and the service sector (Rweyemamu et al., 2023). However, the pandemic significantly slowed economic activities, with GDP growth declining to 2.0% in 2020 (Makoni, 2021). Studies suggest that Tanzania's initial response to the pandemic, including delayed containment measures, contributed to the economic slowdown (Mwakyusa & Masome, 2022). Under recent policy reforms and economic recovery strategies, GDP growth rebounded to 4.6% in 2022, with projections indicating a steady growth rate of 5.2% in 2024 (World Bank, 2024). Despite these positive trends, inflation, global economic uncertainties, and structural inefficiencies remain major concerns for long-term economic stability (Khan & Naushad, 2020).

Recently, the world economy has been showing strength and resilience against all odds, whether it be COVID-19 or the energy crisis (Organization for Economic Cooperation Development [OECD], 2024). Growth of the world's economy is pacing steadily, with a reduction in the upward trend of inflation rates. As labor markets loosened somewhat, unemployment rates remained close to their lows in most countries. The overall level of global trade continued to recover (Pharmaxi & Arriola et al., 2023).

2. MATERIALS AND METHODS

2.1 Data type and source

This study utilizes secondary data spanning from 1960 to 2023 (64 observations), obtained from the world databank- World Development Indicator (WDI). The World Databank is a reputable open-source data platform, widely used in research. The data can be retrieved from the following link; https://databank.worldbank.org/source/world-development-indicators.

2.2 The analysis methods

2.2.1 Autoregressive Integrated Moving Average Model

The Autoregressive Integrated Moving Average (ARIMA) model is a fundamental time series forecasting technique introduced by Box and Jenkins (1970). It combines Auto Regressive (AR), Differencing (I), and Moving Average (MA) components to model and predict time-dependent data. The ARIMA model is represented as ARIMA (p, d, q), where:

- p is the number of autoregressive (AR) terms,
- d is the number of times the series needs to be differenced to make it stationary,
- q is the number of moving average (MA) terms.

Received: 05.08.2025 Accepted: 28.08.2025 Published:29.08.2025

2.2.2 Autoregressive model

The autoregressive (AR) component of a time series model is based on the assumption that the current value of the series depends on a linear combination of its previous values and a random error term. This model assumes that the time series is stationary, meaning that the mean and variance remain constant over time (Box & Jenkins, 1976).However, while stationarity is a key assumption; it does not imply that no diagnostic checks are necessary. In practice, before applying an AR model, it is crucial to perform data diagnostics, such as checking for stationarity using tests like the Augmented Dickey-Fuller (ADF) test or the Kwiatkowski-Phillips-Schmidt-Shin (KPSS) test (Dickey & Fuller, 1979; Kwiatkowski et al., 1992). If the series is non-stationary, transformations like differencing may be required to achieve stationarity before fitting an AR model (Box & Jenkins, 1976).

The general form of the AR(p) model is:

$$Y_t = c + \sum_{i=1}^{p} \phi_i Y_{t-i} + \epsilon_t \qquad (1)$$

Where:

- Y_t is the value of the time series at time t,
- c is a constant term,
- ϕ_i are the autoregressive coefficients,
- p is the number of lagged terms,
- ϵ_t is a white noise error term.

2.2.3 Integrated (I) Component (Differencing for Stationarity)

The integrated (I) component is used to remove trends and make a time series stationary. If a series has a trend, it must be differenced to achieve stationarity. Differencing involves subtracting the previous value from the current value:

$$Y_t^* = Y_t - Y_{t-1}$$

If one difference is not enough, further differencing is applied:

$$Y_t^* = (1 - B)^d Y_t$$

Where:

- B is the backward shift operator $(BY_t = Y_{t-1})_t$
- d is the order of differencing,

Received: 05.08.2025 Accepted: 28.08.2025 Published:29.08.2025

- $(1-B)^d$ represents differencing of order d.

Key Assumptions of Differencing are differencing removes trends but preserves essential structure, and over-differencing can introduce unnecessary complexity and noise.

2.2.4 Moving Average (MA) Component

The moving average (MA) component models a time series as a linear function of past forecast errors. It assumes that current observations depend on past white noise terms rather than past values of the series itself. The general form of the MA (q) model is:

$$Y_t = c + \epsilon_t + \sum_{j=1}^{q} \theta_j \epsilon_{t-j}$$

Where:

- θ_j are moving average coefficients, ϵ_t is the white noise error term, and q is the number of lagged error terms.

Key Assumptions of MA Component are errors are uncorrelated and normally distributed, and the series exhibits short-term shock effects rather than long-term dependencies.

2.2.5 ARMA model

The Autoregressive Moving Average (ARMA) model is a fundamental statistical model used in time series analysis to capture both autocorrelation (dependencies on past values) and random shocks (unexpected variations). The ARMA model was introduced by Box and Jenkins (1970) and is denoted as ARMA (p, q), where:

- p is the number of autoregressive (AR) terms,
- q is the number of moving average (MA) terms.

The ARMA (p, q) model is a combination of Autoregressive (AR) Process which models the current value as a function of past values, and Moving Average (MA) Process which models the current value as a function of past error terms (random shocks).

The general form of the ARMA (p, q) model is:

$$Y_t = c + \sum_{i=1}^{p} \phi_i Y_{t-i} + \sum_{j=1}^{q} \theta_j \epsilon_{t-j} + \epsilon_t$$

Where:

- Y_t is the value of the time series at time t,
- c is a constant term,

Received: 05.08.2025 Accepted: 28.08.2025 Published:29.08.2025

- ϕ_i are the autoregressive (AR) coefficients,
- θ_j are the moving average (MA) coefficients,
- ϵ_t is a white noise error term (random error with mean zero and constant variance).

The AR and MA terms work together to describe the behavior of the time series. The goal is to capture underlying patterns and randomness in the data. The ARMA model is used for stationary time series, meaning that the data has a constant mean and variance over time. If the series is non-stationary, it must first be differenced, which results in an ARIMA model instead.

2.2.6 ARIMA model

Final ARIMA Model Equation that is obtained after combining all three components, the ARIMA (p, d, q) model is given by:

$$\left(1 - \sum_{i=1}^{p} \phi_i B^i\right)(1 - B)^d Y_t = c + \left(1 + \sum_{j=1}^{q} \theta_j B^j\right)\epsilon_t$$

Expanding:

$$\left(1 - \phi_1 B - \phi_2 B^2 - \cdots - \phi_p B^p\right)(1 - B)^d Y_t = c + \left(1 + \theta_1 B + \theta_2 B^2 + \cdots + \theta_q B^q\right)\epsilon_t$$

Where:

- $(1 - B)^d$ represents the differencing component.
- $\left(1 - \phi_1 B - \cdots - \phi_p B^p\right)$ represents the autoregressive component.
- $\left(1 + \theta_1 B + \cdots + \theta_q B^q\right)$ represents the moving average component.

This equation shows that ARIMA is essentially an ARMA model applied to a differenced series.

2.3 Stationarity test

2.3.1 Augmented Dickey-Fuller (ADF) Test

The ADF test is an extension of the Dickey-Fuller test and checks for a unit root in the data (Dickey & Fuller, 1979). The test equation is:

$$\Delta Y_t = \alpha + \beta t + \gamma Y_{t-1} + \sum_{i=1}^{p} \delta_i \Delta Y_{t-i} + \epsilon_t$$

Where:

- $\Delta Y_t = Y_t - Y_{t-1}$ (first difference of the series),

Received: 05.08.2025 Accepted: 28.08.2025 Published:29.08.2025

α is a constant (intercept), βt is a trend term, γ is the coefficient of Y_{t-1}, and p is the number of lagged differences.

Decision Rule:

- If $\gamma < 0$ and statistically significant, the series is stationary.
- If p-value < 0.05, reject H_0, meaning the series is stationary.

2.3.2 Phillips-Perron (PP) Test

The Phillips-Perron (PP) test is similar to the ADF test but makes adjustments for heteroskedasticity and autocorrelation.

The test equation is: $Y_t = \rho Y_{t-1} + \epsilon_t$

where the null hypothesis is: $H_0: \rho = 1$ (non-stationary)

If the p-value < 0.05, we reject H_0 and conclude that the series is stationary.

2.3.3 Kwiatkowski-Phillips-Schmidt-Shin (KPSS) Test

The KPSS test is different from ADF and PP because its null hypothesis assumes stationarity

The test equation is: $Y_t = rt + X_t + \epsilon_t$

Where r is the deterministic trend and X_t is a stationary process.

Decision Rule:

- If p-value < 0.05, reject H_0 meaning the series is non-stationary.

2.3.4 Differencing method

Differencing is a technique used in time series analysis to remove trends and make a non-stationary series stationary. It transforms a series where values depend on time into one where statistical property (mean, variance, and autocorrelation) remain constant. The differencing method is crucial for ARIMA models, where stationarity is required for accurate forecasting**.** The first-order difference of a time series Y_t is given by:

$$\Delta Y_t = Y_t - Y_{t-1}$$

where:

- Y_t is the current observation.
- Y_{t-1} is the previous observation.
- ΔY_t is the differenced series.

If first-order differencing does not achieve stationarity, we apply second-order differencing:

$$\Delta^2 Y_t = (Y_t - Y_{t-1}) - (Y_{t-1} - Y_{t-2})$$

Received: 05.08.2025 Accepted: 28.08.2025 Published:29.08.2025

In general, for d[th] order differencing:

$$\Delta^d Y_t = Y_t - Y_{t-d}$$

where d is the number of differences needed to make series stationary.

2.4 Box-Jenkins methodology for ARIMA Modeling

The Box-Jenkins methodology for ARIMA modeling is a systematic approach to time series forecasting that involves four main steps: model identification, parameter estimation, diagnostic checking and forecasting. Box and Jenkins (1970) proposed a systematic way to build an ARIMA model using four key steps:

2.4.1 Model identification

A preliminary Box-Jenkins analysis should begin with plotting the raw data to determine a suitable model. The data must be transformed into a stationary series, with seasonal patterns identified and addressed through seasonal differencing if needed. Additionally, examining the autocorrelation and partial autocorrelation function (ACF and PACF) plots of the dependent time series helps determine whether to include autoregressive (AR) or moving average (MA) components in the model.

2.4.2 Autocorrelation function

The Autocorrelation Function (ACF) measures the linear relationship between current and past values of a time series at different lags. Mathematically, the autocorrelation at lag k is given by:

$$\rho(k) = \frac{\sum_{t=k+1}^{n} (Y_t - \bar{Y})(Y_{t-k} - \bar{Y})}{\sum_{t=1}^{n} (Y_t - \bar{Y})^2}$$

where:

- Y_t is the time series at time t, $\bar{Y}$ is the mean of the series, k is the lag, and n is the total number of observations.

Use of ACF in Identifying MA (q) Models

- In a pure MA (q) model, the ACF cuts off after **q** lags and becomes approximately zero beyond lag q.
- This means that for a MA (1) process, only the first lag has a significant autocorrelation, and the rest are insignificant.

2.4.3 Partial autocorrelation function

Received: 05.08.2025 Accepted: 28.08.2025 Published:29.08.2025

The Partial Autocorrelation Function (PACF) measures the correlation between the current time series value and a past value, removing the effects of the intermediate lags.

PACF at lag k is computed using the Yule-Walker equations, and it is defined as the coefficient in the regression equation:

$$Y_t = \phi_1 Y_{t-1} + \phi_2 Y_{t-2} + \cdots + \phi_k Y_{t-k} + \epsilon_t$$

where:

- ϕ_k is the partial autocorrelation at lag k,
- ϵ_t is the error term.

Use of PACF in Identifying AR(p) Models

- In a pure AR(p) model, the PACF cuts off after **p** lags and becomes approximately zero beyond lag p.
- This means that for an AR(1) process, only the first lag has a significant PACF, and the rest are insignificant.

2.4.4 Parameter Estimation

In the Box-Jenkins methodology, parameter estimation involves determining the optimal values for the parameters of the autoregressive (AR) and moving average (MA) components of the model, as well as the differencing order (d). This is typically done using methods like Maximum Likelihood Estimation (MLE) or Least Squares. After estimating the parameters, the Akaike Information Criterion (AIC) and Bayesian Information Criterion (BIC) are used to evaluate the model's goodness-of-fit while penalizing for complexity, helping in model selection. The model with the lowest AIC or BIC is preferred, as these criteria balance model accuracy with parsimony, minimizing over fitting. AIC and BIC are critical in selecting the best ARIMA model by comparing models with different combinations of p, d, and q parameters.

Akaike Information Criterion (AIC)

AIC is a measure that evaluates the relative quality of a statistical model. It considers both the likelihood of the model (how well it fits the data) and the number of parameters in the model (to penalize complexity). The formula for AIC is:

$$\text{AIC} = 2k - 2\ln(L)$$

where:

- k is the number of parameters in the model.
- L is the likelihood of the model (the probability of the data given the model).

Received: 05.08.2025 Accepted: 28.08.2025 Published:29.08.2025

A lower AIC value indicates a better model, as it suggests a model that fits the data well without excessive complexity. When comparing models, the one with the lowest AIC is preferred.

Bayesian Information Criterion (BIC)

BIC is similar to AIC but applies a stronger penalty for the number of parameters, especially in models with a large sample size. The formula for BIC is:

$$BIC=\ln(n)\,k-2\ln(L)$$

where:

- n is the number of observations (sample size).
- K is the number of parameters.
- L is the likelihood of the model.

BIC also prefers models with lower values. It imposes a larger penalty for including more parameters compared to AIC, so it tends to select simpler models when the sample size is large.

Diagnostic checking

Diagnostic checking refers to the process of validating a time series model by analyzing its residuals (the difference between observed and predicted values). This step helps assess whether the model accurately captures the underlying data patterns and whether any further improvements or modifications are needed. Diagnostic checking is done after fitting the model, which includes the steps of identification, estimation, and model selection. The main goals of diagnostic checking are to Validate the model assumptions (e.g., residuals should be normally distributed with a mean of zero), Identify any remaining patterns in the residuals, which might indicate that the model has not fully captured all relevant information and to ensure the residuals resemble white noise (random, uncorrelated errors), indicating that no further structure is left to model.

Tools like the Ljung-Box test, Autocorrelation Function (ACF) plots, and histograms of residuals are used in this step. If significant autocorrelation or patterns remain in the residuals, the model might need to be adjusted or re-estimated to better fit the data.

2.5 Forecasting

Selecting an appropriate forecasting model for time series prediction requires the use of suitable forecasting tools. However, the choice of a specific model does not automatically guarantee its effectiveness for prediction. To ensure the selected model is truly suitable for forecasting, it is essential to evaluate its performance using error measurement metrics such as Mean Square Error (MSE), Mean Absolute Error (MAE), and Root Mean Square Error (RMSE). These metrics help

Received: 05.08.2025 Accepted: 28.08.2025 Published:29.08.2025

verify that the chosen model accurately represents the time series data and is reliable for making future predictions.

Mean Square Error (MSE)

Mean Squared Error is a common metric used to evaluate the performance of a predictive model. It measures the average of the squared differences between the predicted values and the actual values. The MSE is defined as:

$MSE = 1/n \sum_{t=1}^{m} \varepsilon_t^2$ Where, ε_t is defined by $\varepsilon_t = Y_i - \hat{Y}_i$

Where, ε_t stands for error term, Y_i stands for observational values, $\hat{Y}_i$ stands for forecasting values, t is the time and m are the total observational data (Phinikarides et al., 2013). MSE gives a high penalty to large errors, as the errors are squared. A smaller MSE indicates better predictive performance of the model, as it means the predictions are closer to the actual values.

Mean Absolute Error (MAE)

Mean Absolute Error is a fundamental metric used to assess the accuracy of a forecasting model. It represents the average of the absolute differences between predicted and actual values, making it one of the simplest and most interpretable error measures. MAE quantifies how much, on average, the model's predictions deviate from the actual observations, without considering the direction of the errors. A lower MAE value indicates a better-performing model with more accurate predictions (Elsaraiti & Merabet, 2021).

Mathematically, MAE is defined as follows (Elsaraiti & Merabet, 2021):

$$MAE = \frac{1}{n}\sum_{i=1}^{n} \left|Y_i - \hat{Y}_i\right|$$

Where:

- n is the total number of observations,
- Y_i represents the actual values,
- $\hat{Y}_i$ represents the predicted values,
- $\left|Y_i - \hat{Y}_i\right|$ is the absolute error for each observation.

Since MAE does not square the errors like Mean Squared Error (MSE), it retains the original scale of the data, making it easy to interpret. However, it treats all errors equally without giving more weight to larger deviations.

Root Mean Square Error

Received: 05.08.2025 Accepted: 28.08.2025 Published:29.08.2025

Root Mean Squared Error (RMSE) is simply the square root of the Mean Squared Error (MSE). It is another common metric used to evaluate the performance of a model, particularly when we want to express the error in the same units as the original data, making it more interpretable (Elsaraiti & Merabet, 2021). The RMSE is defined as:

$$RMSE = \sqrt{\frac{\sum_{i=1}^{n} \left(y_{\text{prodicted}} - y_{\text{actual}}\right)^2}{n}}$$

where, $y_{\text{predicted}}$ are the predicted values of the observations, y_{actual} are the actual values of the observations and n gives the total number of observations (Elsaraiti & Merabet, 2021). When the value of measure of error is around zero, then it means that model has the perfect skills for forecasting or in other words we say the models has no errors (Quarrie et al., 1998). It is important to note that when the values of measures of errors are smaller, it indicates that the model is the best for forecasting purposes. In general, a lower RMSE indicates a better fit of the model to the data.

3. RESULTS AND DISCUSSION

3.1. Descriptive analysis

Table 1 shows the descriptive statistics of the GDP following by a discussion underneath.

Table 1: Descriptive statistics of the GDP in USD billion (TZ) at current prices, 1960-2023.

Description	**Statistic (Billion USD)**
Mean	19475498880
Median	11283713014
Standard deviation	20542033811
Minimum	2651729807
Maximum	79062403821
Skewness	1.494880397
Kurtosis	4.059595746

Source: Created by authors

Table 1 shows the result of the descriptive analysis of GDP of Tanzania at current prices, revealing key statistical insights into its distribution and growth pattern. The mean GDP is $19.48 billion,

Received: 05.08.2025 Accepted: 28.08.2025 Published:29.08.2025

indicating the average economic size over the period, while the median GDP of $11.28 billion suggests that half of the observations fall below this value. The standard deviation of $20.54 billion highlights significant variability in GDP, reflecting substantial economic expansion over time.

The minimum GDP recorded was $2.65 billion, while the maximum reached $79.06 billion, illustrating a strong upward trend in economic performance. The skewness value of 1.49 indicates a right-skewed distribution, meaning GDP values are concentrated on the lower end with higher values in recent years. Furthermore, the kurtosis of 4.06 suggests a leptokurtic distribution, indicating the presence of a few extreme values that have significantly influenced the overall GDP trend. These findings confirm Tanzania's consistent economic growth, albeit with fluctuations over the years.

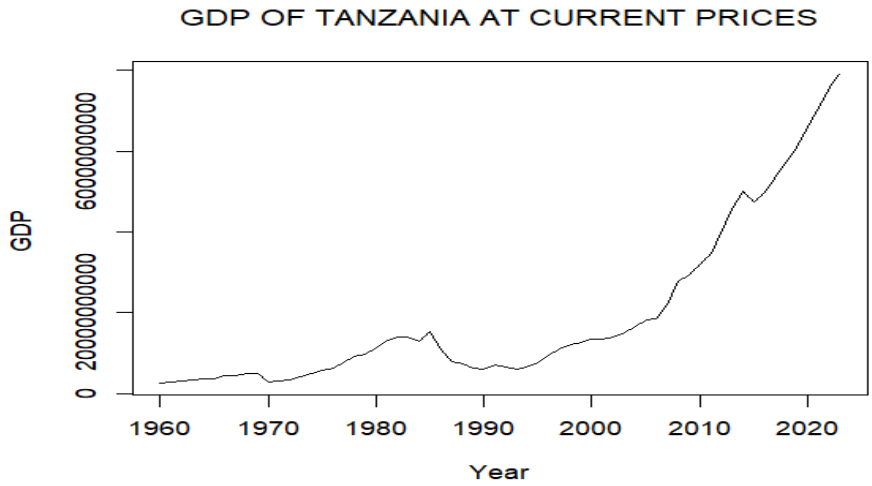


Figure 1: Trend Analysis of GDP (USD billion) at current price of Tanzania

Source: Created by authors

As observed the GDP at current prices trend of Tanzania from 1960 to 2023 shows an overall upward trajectory, indicating economic growth over time. However, the peaks in the GDP values do not repeat at regular intervals or with the same intensity, suggesting irregularities and fluctuations in the growth pattern. This behavior points to non-stationary in the data, where statistical properties like mean and variance change over time due to various economic factors. To address this, transformations using differencing method where first differencing (d=1) was not enough when applied to make the series stationary hence second differencing (d= 2) transformed data into stationary. This is in agreement with (Enders, 2015) that when time series data is not

Received: 05.08.2025 *Accepted: 28.08.2025* *Published:29.08.2025*

stationary, performing differencing will make the data stationary, and therefore further analysis can be carried out, as also suggested in Cheti and Ilembo (2021). The Dickey-Fuller test further confirmed the stationarity after transformation, making the data suitable for reliable forecasting and analysis.

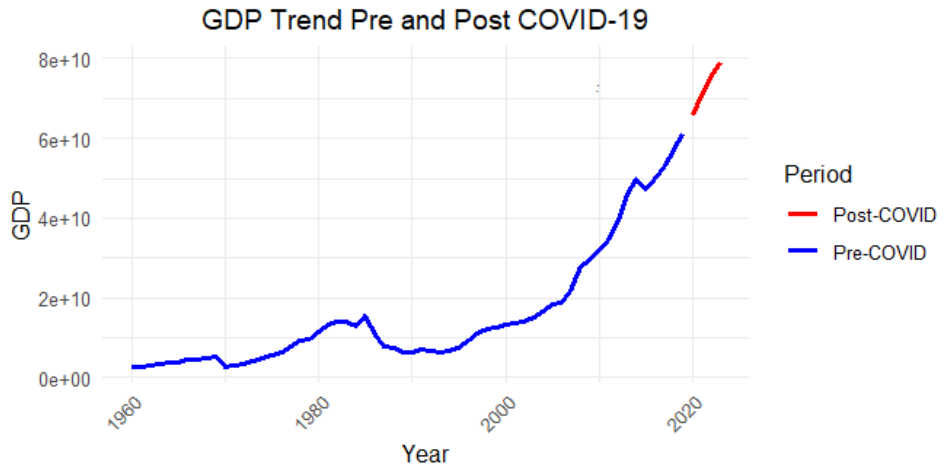


Figure 2: Trend of GDP Pre and Post COVID-19

Source: Created by authors

Figure 2 illustrates Tanzania's GDP at current prices trend from 1960 to the post-COVID-19 period, distinguishing between pre-COVID and post-COVID trends using different colors. The blue line represents GDP growth before the pandemic, showing a general upward trajectory with occasional fluctuations. Notably, GDP growth appears relatively stable but exhibits significant acceleration in the 2000s, reflecting economic expansion.

However, the post-COVID GDP trend, represented by the red segment, suggests continued growth despite potential disruptions caused by the pandemic. (Capello, et. al., 2021). The visualization implies that Tanzania's economy remained resilient, continuing its upward trajectory even after the global economic downturn induced by COVID-19. The consistent rise in GDP post-COVID may indicate strong economic policies, recovery efforts, and structural growth factors supporting Tanzania's economy. However, further analysis would be required to determine the pandemic's specific impacts and whether growth has been slowed or accelerated relative to pre-COVID projections. As also suggested by Chirwa (2023).

Received: 05.08.2025 *Accepted: 28.08.2025* *Published:29.08.2025*

These observation is consistent with assessment by institutions such as the World Bank and the International Monetary Fund (IMF), both of which have noted Tanzania`s relative economic resilience during the pandemic period, attributing it to a combination of targeted fiscal measure, less severe lockdown restrictions, and the country`s diversified economic base (World Bank, 2022; IMF, 2022).

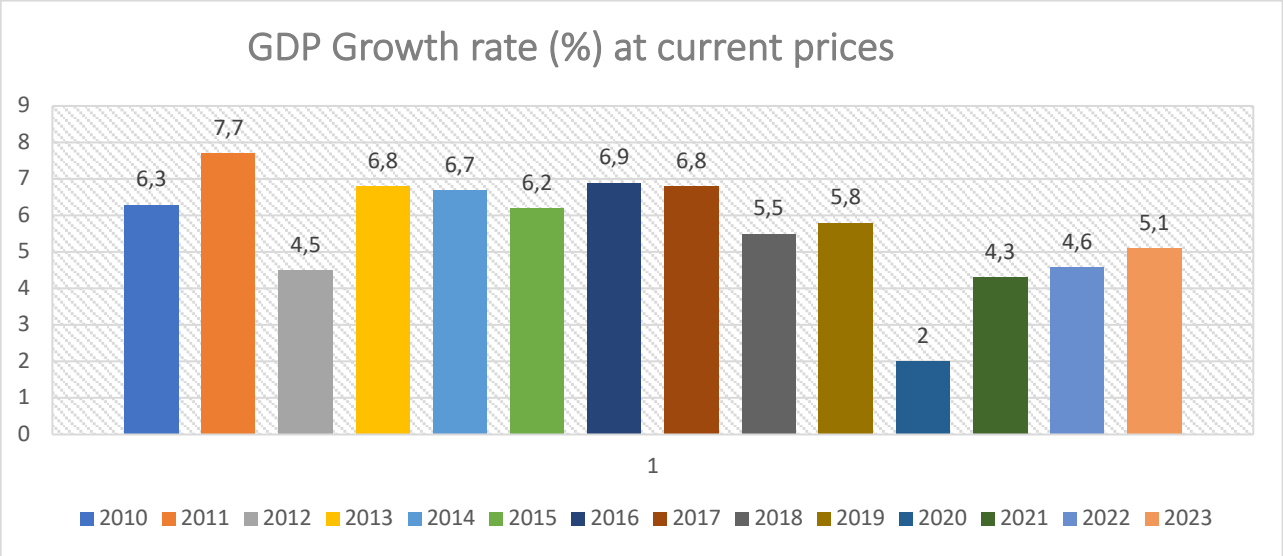


Figure 3: GDP Growth rate at current prices (USD billion) analysis from 2010-2023

Source: Created by authors

Figure 3 shows a clustered-column chart of GDP growth rate of Tanzania at current prices which demonstrated a clear distinction between the pre-COVID-19 (2010–2019) and post-COVID-19 (2020–2023) periods. Before the pandemic, Tanzania exhibited strong and stable economic growth, with rates fluctuating between 6.2% and 7.7%, reaching its peak in 2011 at 7.7%.

However, in 2020, during the COVID-19 crisis, the growth rate sharply declined to 2%, reflecting the economic disruptions caused by lockdowns, reduced trade, and global economic slowdowns. In the post-pandemic period (2021–2023), the economy shows signs of recovery, with GDP growth rising to 4.3% in 2021, 4.6% in 2022, and 5.1% in 2023. Although the growth is improving, it has not yet returned to pre-pandemic levels, indicating a gradual recovery process.

Received: 05.08.2025 Accepted: 28.08.2025 Published:29.08.2025

3.3 Stationarity tests

A stationarity test is used to determine whether a time series has constant statistical properties, such as mean and variance over time an essential, requirement for accurate ARIMA modeling. Ensuring stationarity helps prevent misleading forecasts and ensures the model`s reliability. Table 2 presents the summary of the stationarity test results

Table 2: Stationarity tests to check stationarity of time series data

Test	Statistic	P-value
ADF Test	0.9363159665	0.990
Phillips-Perron Test	4.1177851151	NA

Source: Created by authors

Table 2 shows the results of the stationarity tests. The Augmented Dickey-Fuller (ADF) test returned statistics of 0.9363 (p = 0.990), which is greater than the 0.05 significance level, meaning we fail to reject the null hypothesis that the series has a unit root. This suggests that GDP follows a trend and is not stationary. Similarly, the Phillips-Perron (PP) test produced a test statistic of 4.1178, which, when compared to typical critical values, further confirms that the series is non-stationary. The absence of a p-value for the PP test means we rely on its test statistic, which aligns with the ADF results.

Since GDP at current prices exhibits a trend over time, any shocks to the economy are likely to have long-term effects rather than temporary fluctuations. This also implies that direct time series modeling using ARIMA or other forecasting techniques requires transformation. To make the series stationary, first differencing should be applied followed by rechecking stationarity using the same tests. Once the series is made stationary, appropriate time series model which is ARIMA, is fitted for forecasting purposes.

Table 3: Stationarity tests to check stationarity for the differenced time series data

Test	Statistic	P-value
ADF Test	-6.12408940397	0.010
Phillips-Perron Test	-66.39398834784	NA

Source: Created by authors

Received: 05.08.2025 Accepted: 28.08.2025 Published:29.08.2025

After confirming that the GDP series at current prices was non-stationary, first differencing was applied to remove the trend. However, the stationarity tests still indicated the presence of a unit root, suggesting that first differencing was insufficient. Consequently, second differencing was applied, which successfully transformed the series into a stationary form.

Table 3 shows the results of the Augmented Dickey-Fuller (ADF) test which showed a statistic of -6.1241 with a p-value of 0.010, allowed the rejection of the null hypothesis of a unit root, confirming stationarity.

Additionally, the Phillips-Perron (PP) test resulted in a highly negative statistic of -66.394, reinforcing the conclusion that the GDP series became stationary after the second differencing. These results confirmed that the original GDP series required second differencing to achieve stationarity, thereby making it suitable for time series modeling and forecasting

3.4 ARIMA Modeling Using the Box-Jenkins Methodology

After successfully transforming the GDP time series into a stationary form through second differencing, the next step involves applying the Box-Jenkins methodology to develop an ARIMA model using RStudio. The Box-Jenkins approach follows a structured process of model identification, parameter estimation, and diagnostic checking to ensure the best-fitting model is selected. With stationarity achieved, the next step is examining the ACF and PACF plots to determine appropriate values for the autoregressive (p) and moving average (q) components. The **auto.arima** function in R is used to identify an optimal ARIMA model by selecting the best model based on information criteria, such as the AIC and BIC. After the model is estimated, residual diagnostics are conducted to evaluate the adequacy of the model. This step ensures that the residuals resemble white noise. A well-specified ARIMA model is then used to forecast Tanzania's GDP trends, providing valuable insights for economic planning and policy formulation

Model identification and selection

The model identification phase involved examining the stationarity of the GDP time series Andrei & Bugudui (2011). Once stationarity was achieved, the selection of AR and MA terms is optimized and automated using the auto. arima () function in RStudio, which systematically evaluates multiple ARIMA specifications and selects the best-fitting model based on statistical criteria such as AIC and BIC. This function helped to eliminate the need for manual trial-and-error selection by

Received: 05.08.2025 Accepted: 28.08.2025 Published:29.08.2025

efficiently scanning through a range of model configurations and determining the most appropriate structure for the data.

The ARIMA(0,2,1) model was selected as the best-fitting model for forecasting GDP, The series was differenced twice (d = 2) to remove long-term trends and achieve stationarity. The presence of a moving average component of order 1 (MA (1) = -0.7174) suggests that the model accounts for short-term shocks in GDP fluctuations, meaning that the current GDP value is influenced by past forecast errors. The absence of an autoregressive component (p = 0) indicates that past GDP values beyond differencing do not significantly contribute to the predictions.

The selection of the ARIMA (0,2,1) model was based on the AIC and BIC, both of which measure model performance while penalizing complexity. The selected model had the lowest AIC and BIC values compared to alternative specifications, confirming its suitability for GDP forecasting.

Model Estimation

The model parameters were estimated using the auto. arima () function in R software, which automatically selects the best ARIMA model by evaluating various combinations of autoregressive (AR), differencing (I), and moving average (MA) terms. This function uses maximum likelihood estimation (MLE) to estimate the coefficients, including the MA (1) coefficient of -0.717 in the selected ARIMA (0,2,1) model.

Diagnostic checking

i. Ljung-Box test

The Ljung-Box test was performed to check for autocorrelation in the residuals to assess adequacy of the ARIMA (0,2,1) model for GDP forecasting. The Ljung-Box test evaluates whether the residuals of the fitted model are independent (white noise) or if they still exhibit significant patterns, which would indicate model inadequacy.

Table 4: Ljung Box test for the residual

x^2	Degree of freedom	p-value
7.3406	8	0.5004

Source(s): Created by author

Received: 05.08.2025 Accepted: 28.08.2025 Published:29.08.2025

Table 4 shows that p-value (0.5004) is greater than compared to the standard significance level ($\alpha = 0.05$), we fail to reject the null hypothesis (H_0). This suggests that there is no significant autocorrelation in the residuals, meaning the residuals are uncorrelated and purely random distributed. Consequently, the ARIMA (0,2,1) model is considered adequate and well-specified, as it effectively captures the time series structure without leaving systematic patterns in the residuals.

ii. ACF plot for residual

ACF plot of the residuals is a crucial diagnostic tool used to assess whether the ARIMA (0,2,1) model has adequately captured the underlying structure of the GDP time series.

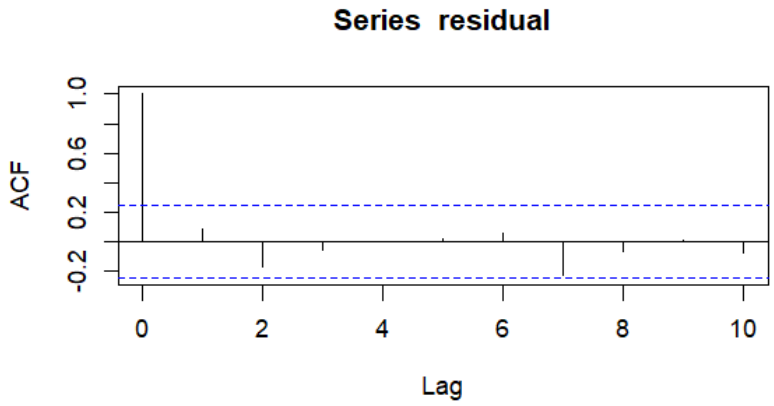


Figure 4: ACF plot for residual

Source: Created by authors

In figure 4, the autocorrelations at different lags are displayed, with blue dashed lines representing the confidence bounds (typically at the 95% confidence level). Most autocorrelation values fall within these bounds, which it suggests that the residuals exhibit no significant autocorrelation, indicating that the model has effectively removed systematic patterns from the data.

Since the ACF plot does not show any significant autocorrelation, the residuals appear to be random and uncorrelated, confirming that the ARIMA (0,2,1) model is well-specified. This supports the results from the Ljung-Box test, further validating that the model is appropriate for GDP forecasting and does not require additional modifications.

Received: 05.08.2025 Accepted: 28.08.2025 Published:29.08.2025

Validating the model

Model validation is conducted to evaluate how accurately the model estimates the observed values. The predicted forecasts for the validation set are compared visually by plotting them alongside the actual data.

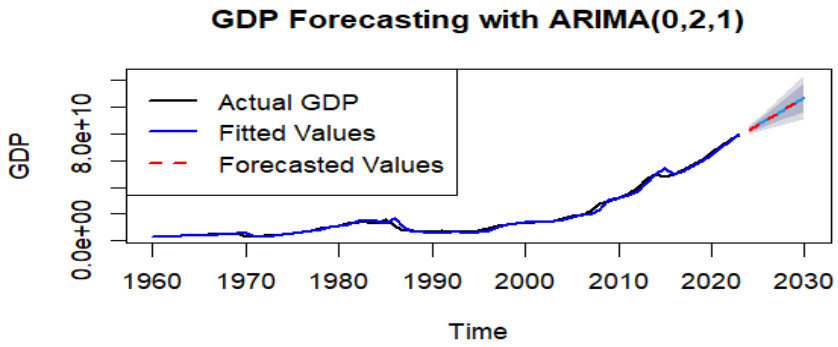


Figure 5: GDP forecasting

Source: Created by authors

Figure 5 shows the plotted GDP forecasting results using the ARIMA (0,2,1) model provide a clear visualization of the model's performance. The black line, representing actual GDP values, allows for direct comparison with the blue line (fitted values) and the red dashed line (forecasted values). The close alignment between the blue fitted values and the black actual values indicates that the model has effectively captured historical trends, demonstrating a strong fit.

Furthermore, the red forecasted values extend logically from the fitted trend, suggesting that the model provides reliable future GDP predictions. The absence of large deviations between the fitted and actual values further confirms the model's accuracy and effectiveness in forecasting GDP.

Accuracy Measurement

The accuracy of the ARIMA (0,2,1) model for GDP forecasting is evaluated using multiple error metrics from the training set. The Mean Percentage Error (MPE = 1.018%) and Mean Absolute Percentage Error (MAPE = 8.83%) provide a relative measure of forecast accuracy, showing that the model's predictions deviate by approximately 8.83% on average from actual GDP values. Since MAPE is below 10%, the model demonstrates reasonable predictive performance.

The Mean Absolute Scaled Error (MASE = 0.5967), being less than 1, suggests that the ARIMA model performs better than a naive forecasting approach. Lastly, the Autocorrelation of Residuals

Received: 05.08.2025 *Accepted: 28.08.2025* *Published:29.08.2025*

at Lag 1 ($ACF_1 = 0.0863$) is close to zero, confirming that the residuals exhibit minimal correlation, meaning the model has adequately captured the time series patterns without significant remaining dependencies. These accuracy metrics collectively indicate that the ARIMA (0,2,1) model provides a reasonably accurate and reliable forecast for GDP trends.

3.5 Forecasting

Based on the ARIMA (0,2,1) model, GDP at current prices from 2024 to 2030 is provided in Table 5, and Figure 6 shows the trend of forecasted GDP at current prices in USD billion of Tanzania.

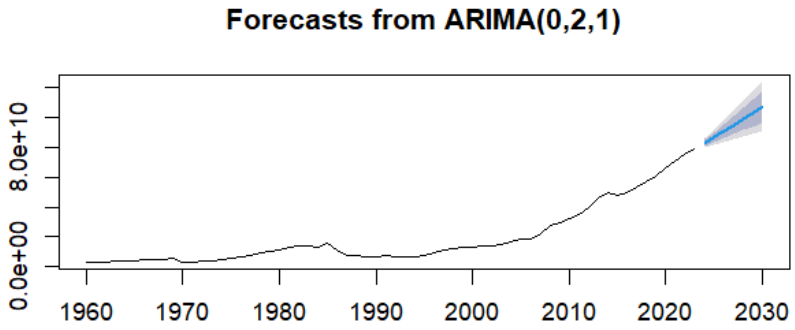


Figure 6: Model validation of GDP at current prices of Tanzania using ARIMA (0,2,1)
Source: Created by authors

Table 5: Forecasted values for the GDP at current prices of Tanzania in USD billion at 95% confidence interval

Time	Forecast	Lower (95% CI)	Upper (95% CI)
2024	83,080,028,892	79,847,506,796	86,312,550,988
2025	87,097,653,964	81,840,352,574	92,354,955,353
2026	91,115,279,035	83,818,755,901	98,411,802,169
2027	95,132,904,106	85,703,244,069	104,562,564,143
2028	99,150,529,177	87,473,794,743	110,827,263,612
2029	103,168,154,249	89,125,670,165	117,210,638,333
2030	107,185,779,320	90,659,334,499	123,712,224,142

Source: Created by authors

Received: 05.08.2025 Accepted: 28.08.2025 Published:29.08.2025

The forecast plot from the ARIMA (0,2,1) model provides projections for GDP from 2024 to 2030 based on historical trends. The black line represents the actual GDP data from 1960 to 2023, showing a general upward trend with some fluctuations. The forecasted values shown in blue extend beyond the observed data, indicating continued GDP growth.

The shaded areas around the forecast represent the 95% confidence intervals, with the darker blue indicating higher confidence and the lighter gray regions showing a wider uncertainty range. As time progresses, the confidence intervals widen, reflecting increasing uncertainty in long-term forecasts.

From Table 5 of the forecasted values, GDP is expected to increase from 83.08 USD billion in 2024 to approximately 107.19 USD billion in 2030. The lower and upper bounds provide a range within which GDP is likely to fall, with a growing gap as time advances due to accumulated uncertainty.

Overall, the ARIMA (0,2,1) model suggests that Tanzania's GDP will continue its upward trajectory, aligning with historical growth patterns. However, the widening prediction intervals indicate that future GDP values could vary depending on economic policies, external shocks, or global economic conditions.

4. CONCLUSION

The findings revealed that while Tanzania's economy has experienced consistent long-term growth, it remains vulnerable to external shocks, as seen in the sharp decline in GDP growth to 2% in 2020 due to the pandemic. However, the rapid recovery to 4.6% growth in 2022 highlighted the country's economic resilience, driven by policy interventions, adaptive industries, and the gradual reopening of global markets. The model forecasts steady growth, projecting a 5.2% increase in GDP by 2024, signaling a positive outlook for the nation's economic trajectory.

This study analyzed Tanzania's GDP trends before and after the COVID-19 pandemic, using the ARIMA model to assess economic performance and forecast future growth. The findings indicate that Tanzania's GDP exhibited steady growth before 2020, averaging around 6.5%, but experienced a sharp decline to 2.0% in 2020 due to the economic disruptions caused by the pandemic. However, the economy demonstrated resilience, with GDP rebounding to 4.6% in 2022 and projected to stabilize at 5.2% in 2024.

Received: 05.08.2025 Accepted: 28.08.2025 Published:29.08.2025

These findings emphasize that, despite external shocks, Tanzania's economic structure and policy interventions have enabled recovery and sustained progress. However, the study acknowledges limitations, as ARIMA models, while powerful, may struggle to capture sudden economic disruptions or structural breaks caused by unforeseen crises.

Despite the robustness of the ARIMA model, the study acknowledged certain limitations. The model relies solely on past values and may struggle to account for sudden, unexpected shocks or structural changes in the economy. For instance, factors like inflation, exchange rates, and global commodity prices all of which significantly influence GDP were not included as independent variables. Incorporating these variables in future research could improve forecast accuracy and offer a more nuanced understanding of the drivers of economic growth.

Future research could enhance forecasts by integrating additional variables, such as inflation rates, global commodity prices, and regional trade dynamics, to build a more comprehensive economic outlook. Ultimately, this research underscores the value of data-driven forecasting for guiding policy decisions and reinforcing Tanzania’s long-term growth trajectory.

Overall, the study concludes that statistical modeling, when combined with sound economic analysis, can be a powerful tool for informing policy decisions. The insights gained from this research provide policymakers with valuable information to guide resource allocation, design targeted interventions, and build economic resilience. However, sustaining growth will require continuous monitoring of global and domestic conditions, proactive policy adjustments, and strategic investments in sectors with high growth potential. By embracing data-driven decision-making and addressing structural vulnerabilities, Tanzania can not only achieve sustained GDP growth but also position itself as a rising economic powerhouse in East Africa and beyond.

5. POLICY IMPLICATIONS

The findings of this study offer valuable insights for policymakers, development planners, and government officials in Tanzania, emphasizing the need for proactive, evidence-based strategies to sustain GDP growth and build economic resilience. First, the government should prioritize economic diversification by strengthening sectors like manufacturing, agribusiness, and digital services to reduce reliance on tourism and primary commodities, which are highly vulnerable to global market fluctuations.

Received: 05.08.2025 *Accepted: 28.08.2025* *Published:29.08.2025*

Investing in infrastructure development, education, and technological innovation can unlock new growth drivers and increase the country's competitiveness. Additionally, the study highlights the critical role of adaptive fiscal and monetary policies during crises policymakers should build contingency frameworks that allow for rapid adjustments to interest rates, targeted subsidies, and strategic public spending to cushion against future shocks. Strengthening data collection and statistical capacity will also enhance policy precision, enabling decision-makers to continuously monitor economic indicators and adjust strategies in real time.

Finally, fostering regional and global integration through trade agreements, foreign direct investment incentives, and participation in regional value chains can shield the economy against external disruptions while expanding market access for Tanzanian goods and services. By leveraging these policy insights and maintaining a forward-looking approach, Tanzania can not only safeguard its economic progress but also position itself as a resilient and dynamic player in the global economy.

REFERENCES

Adegbite, T. A. (2023). Do the Consequence of Taxation Impact Household Consumptions in Nigeria? Absolute Outcome from Autoregressive Distributed Lag (ARDL). *South Asian Journal of Finance*, *3*(2), 112–130. https://doi.org/10.4038/sajf.v3i2.65

African Development Bank (AfDB). (2021). *African Economic Outlook 2021:* From Dept. Resolution to growth: The road ahead for Africa. African Development Bank Groups.

Agwanda, B., Dagba, G., Opoku, P., Amankwa, M. O., & Nyadera, I. N. (2021). Sub-Sahara Africa and the COVID-19 Pandemic: Reflecting on Challenges and Recovery Opportunities. *Journal of Developing Societies*, *37*(4), 502–524. https://doi.org/10.1177/0169796X211032567

Amenu, K., Megersa, B., Jaleta, M. B., Dinede, G., Worku, H., Kasim, K., Taha, M., Ibrahim, A. M., Kedir, J., Mego, L., Roesel, K., Roothaert, R., Srinivasan, R., Grace, D., & Knight-Jones, T. (2023). Potential food safety risks in tomato value chains in urban settings of Eastern Ethiopia: a qualitative investigation. *Frontiers in Sustainable Food Systems*, *7*. https://doi.org/10.3389/fsufs.2023.1254000

Bailey, D., Crescenzi, R., Roller, E., Anguelovski, I., Datta, A., & Harrison, J. (2021). Regions in Covid-19 recovery. *Regional Studies*, *55*(12), 1955–1965. https://doi.org/10.1080/00343404.2021.2003768

Received: 05.08.2025 *Accepted: 28.08.2025* *Published:29.08.2025*

Box, G., Jenkins, G., Reinsel, G. (1994). *Box - Time Series Analysis 3rd ed.pdf*.

Cheti, R. R., & Ilembo, B. (2021). Vector Autoregressive Approach After First Differencing: a Time Series Analysis of Inflation and Its Determinants in Tanzania. *Oradea Journal of Business and Economics*, *6*(2), 43-56.

Chirwa, M. (2023). Accelerating Global Economic Recovery and Building Resilient Economies in the Post –COVID-19 Era. *Journal of Applied Business & Economics, 25(5)*

Dickey, D. A., & Fuller, W. A. (1979). Distribution of the Estimators for Autoregressive Time Series with a Unit Root. Journal of the American Statistical Association. In *Journal of the American Statistical Association* (Vol. 74, Issue 366, pp. 427–431).

Elsaraiti, M., & Merabet, A. (2021). A comparative analysis of the arima and lstm predictive models and their effectiveness for predicting wind speed. *Energies*, *14*(20). https://doi.org/10.3390/en14206782

International Monetary Fund. (2023*). Annual report 2023: committed to collaboration* [Annual report]. International Monetary Fund.

Kassegn, A., & Endris, E. (2021). Review on socio-economic impacts of 'Triple Threats' of COVID-19, desert locusts, and floods in East Africa: Evidence from Ethiopia. *Cogent Social Sciences*, *7*(1). https://doi.org/10.1080/23311886.2021.1885122

Khan, N., & Naushad, M. (2020). Inflation Relationship With the Economic Growth of the World Economy. *SSRN Electronic Journal*. https://doi.org/10.2139/ssrn.3542729

Kira, A. R. (2023). The Efficiency and Effectiveness of Fiscal Policy in Tanzania. *Modern Plastics*, *78*(10), 10.

Kwiatkowski, D., Phillips, P. C. B., Schmidt, P., & Shin, Y. (1992). Testing the null hypothesis of stationarity against the alternative of a unit root. How sure are we that economic time series have a unit root? *Journal of Econometrics*, *54*(1–3), 159–178. https://doi.org/10.1016/0304-4076(92)90104-Y

Makoni, B. (2021a) *`A pair of buttocks` that everybody hates: Radical rudeness as a resistance strategy. Gender & Language,* 15(4), 549-558.

Mankiw, N. G. (2020). The covid-19 recession of 2020. *Obtenido De*, *August*, 1–7.

Mulenga, R. (2024). *Navigating Global Economic Volatilities : Towards Economic Resilience*. *3*(1), 295–308.

Received: 05.08.2025 *Accepted: 28.08.2025* *Published:29.08.2025*

Muoki, S. M. (2023). *An online stock market recommender system using machine learning* (Master`s thesis, Strathmore University). Strathmore University Repository.

Organization for Economic Co-operation and Development. (2024). OECD *Economic Outlook; Volume 2024 Issue 1: An unfolding recovery*. OECD Publishing

Parmaxi, A., & Arriola, J. M. (2023). A systematic review of the cognitive impact of digital media modalities on reading comprehension in L2. *Investigaciones Sobre Lectura,* 18(2), 56-87.

Phinikarides, A., Makrides, G., Kindyni, N., Kyprianou, A., & Georghiou, G. E. (2013). ARIMA modeling of the performance of different photovoltaic technologies. *Conference Record of the IEEE Photovoltaic Specialists Conference*, 797–801. https://doi.org/10.1109/PVSC.2013.6744268

Rweyemamu, M., Aikaeli, J., & Ruvanda, E. (2023). Manufacturing Exports and Economic Growth in Tanzania. *Tanzanian Economic Review*, *12*(2), 21–42. https://doi.org/10.56279/ter.v12i2.120

United Nations Conference on Trade and Development. 92021*). Report of the fifteenth season of the United Nations Conference on Trade and Development* (TD/541). Geneva: United Nations.

United Nations Economic Commission for Africa (UNECA*) Economic report on Africa 2021: Addressing poverty and vulnerability in Africa during the COVID-19 pandemic*: United Nations.

World Bank. (2024*). Annual report 2024: A better world*. World Bank.

World Bank. (2023*). Africa`s pulse, April 2023. Leveraging resource wealth during the low carbon transition* [Issue 27]. World Bank

DISCLOSURE OF CONFLICT

The author(s) declare that they have no conflicts of interest.

FORCE: Focus on Research in Contemporary Economics *2025 - Vol:6 No:1*

Received: 06.01.2024 *Accepted: 07.08.2025* *Published:29.08.2025*

THE NEXUS BETWEEN CONVENTIONAL BASEL FRAMEWORKS AND OVERALL FINANCIAL INSTABILITY MITIGATION PREREQUISITES

Mohamed Miras Marzouki- Université de Tunis El Manar

Email: mirasmarzouki@gmail.com

ORCID: 0000-0003-3244-0847

Abstract

This article discusses theoretically the notion of risk stemming from the financial sector with a perspective closely linked to criteria involving various financial stability related aspects of risk. It reinvigorates the conventional Basel framework in its second third and fourth versions by attempting to elucidate their shortcomings afferent to their purview and scope and tries to complement them by enunciating the requirement of setting a prudential framework that tackles the issue of financial instability emanating from the stock market for the scope of going deeper inside the fundamentals of risk stemming from the Stock market and a thorough early warning approach dealing with the issue of the hindrance of time reaction mismatch of the prudential authority and hence the priority of setting a long run forwarded guided prudential surveillance methodology to avoid the surprise effect of unforecasted events that might erupt abruptly for the purview of the scope of predicting forthcoming risks in advance. The early warning purview unveils the requirement of ensuring in advance resilience from the onslaught of financial crises for the sake of annihilating threats to financial stability over the long run and reveals to be the best initiative to take in order to solve the contingency of having to deal with unexpected risks that might arise abruptly and should have been dealt with in advance as time reaction simultaneous to actual occurrence of hindrances is not affordable.

Keywords: Basel Framework Shortcomings, Financial Instability Mitigation, Early Warning Systems

Received: 06.01.2024 Accepted: 07.08.2025 Published:29.08.2025

1. INTRODUCTION

The Basel framework in all its versions tried to tackle the issue of prudential surveillance and to find a way out of systemic exposure for the credit market. It is accountable for many improvements in terms of resilience from risk root items and the outburst of financial meltdowns but still remains with many shortcomings that have to be annihilated in order to ascertain complete resilience. One first step to achieve this goal is to criticize accurately the Basel framework and show explicitly its shortcomings for the sake of finding an end to them. While ascertaining to accomplish this endeavoring task we find theoretical evidence of a prominent role played by items exerting cross effects among financial sectors such as Risk moments Risk dispersion over time, and henceforth early warning systems, the issues of NPLs, Borrowers creditworthiness, Information asymmetries and so on. This been said as long as stock market sector stability matters a lot for overall financial stability; it still stands that the issue of hedging raises a debate of having to face complicated ordeals having cross effects that reveal controversial as their implications require choice of priorities in situations where accomplishment of all alternatives is a must to ensure adequate resilience from risk hindrances root causes, the onslaught of financial meltdowns and improved performance of the financial sectors simultaneously whenever the situation of one is compromising for the situation of the other as is clearly obvious. In this chapter we raise numerous issues related to financial instability mitigation prerequisites and try to provide adequate answers to them.

Is the Basel IV framework based on sensitivity analyses a good fit for an upgrading of conventional prudential surveillance? What instruments grasp most the basics of threats accompanying uncertainty, excessive fluctuations of equity prices and systemic market risk? Is a new structural expression of Risk needed to better grasp its key features and afford its supervision, and does it sketch to finance theory implications as to principles of dispersion? How do main features characterizing the credit sector such as information asymmetries, non-performing loans and borrowers' credit worthiness affect share prices volatility thereby exacerbating financial stability and the propagation of risk root items across financial sectors? Is there a need for adopting long run prudential surveillance grasped by what we would call early warning? What are the prerequisites for ensuring a best forecasting of long run relationships or jump effects in terms of prudentiality? What specific role is played by hedging in terms of prudentiality for both the credit

Received: 06.01.2024 Accepted: 07.08.2025 Published:29.08.2025

sector and the stock market sector? The conventional macro prudential framework of surveillance assumes implicitly that is sufficient to promote financial stability for the overall financial system and mitigate related financial vulnerabilities and risk. These assertions should be subjected to strong criticism as stock market risk stands for a financial instability driver as much as the credit market. Besides what complicates further the endeavor of ensuring awareness and resilience of the banking system is that it is not sufficient to make other financial sectors fit the financial instability mitigation prerequisites and that indeed the various financial sectors interact with each other with many respects. Here the issues of non-performing loans information asymmetries and borrowers credit worthiness along with hedging further complicate the analysis and generates externalities or side effects that might reveal being problematic in that they raise a controversial interrogation on the stake of efficiency and stability in ensuring complete resilience and accurate performance of both financial sectors. The perspective of risk mitigation should encompass risk mitigation of economic projects. Alongside risk mitigation of risk coming from liquidity and credit risk from the banking perspective and excess volatility and hedging deteriorating consequences coming from trading of securities, it is clear that a perspective directed towards economic and business projects where project risk is divided into equity relative risk and external borrowing relative risk grasps the credit risk pertaining to the banking sector and one part of volatility in the share prices coming from disinformativeness with respect to share prices and profitability outcomes pertaining to the stock market sector. In this respect the dispersion of risk measured by its variance, the moments which are skew and curtosis of risk matter far more than barely limiting prudential intervention to banking and stock market supervision. There should be room to target framing variance of risk in such a way that makes early warning easier for clear-sightedness of future hindrances to systemic risk mitigation. Furthermore, as credit and liquidity risks are generally subjected to jump effects that herald unexpectedly, it is obviously of commensurate importance to go deep inside the likelihood of having regime switching models that describe at best over the long run the behavior of items related to systemic exposure such as credit risk or liquidity risk or illiquidity risk. Besides information asymmetries and inefficiency result in generation of risks as they are structural market imperfections that exacerbate the prevalence of conjectural hindrances such as credit risk and excess volatility of share prices in the credit market and stock market respectively. In the following, we will deal with each issue separately with full consideration of their interlink ages and implications on each other.

Received: 06.01.2024 Accepted: 07.08.2025 Published:29.08.2025

2. A NEW COMPOSITION OF RISK AND A BINDING CONDITION FOR RISK DISTRIBUTION IN COMPLIANCE WITH FINANCE THEORY

2.1 Composition of Risk

In the literature on Risk and credit risk, the usually adopted Risk composition is about idiosyncratic risk and systemic risk. We assume with reference to Frei (2017), that Risk comprises three main components.

-The point in time component which involves subjection to cyclicality and autocorrelation.

-The stable component or through the cycle component which involves innovation due to industrial specificities.

-The uncertainty component which is exclusively tributary to uncertainty and is neither subject to cyclicality nor to industry specificities and is distinguished by asymptotic un-correlation and asymptotic neglectibility of innovations.

This composition displays the feature of disentangling the aspects depictable through prudential restrictions from those subjectable to probabilistic assessments and those retraceable with business cycle related analyses,

As a matter of fact, uncertainty should be subjected to probabilistic assessments whereas through the cycle aspects should be targeted through prudential restrictions and point in time risk can be traced back by comparing its pattern to that of OG within the framework of business cycle analyses.

Risk mitigation involves being cautious about financial stability which grasps its main drawbacks on the financial system.

Risk implies financial vulnerability and instability and is assumed to harm the entire financial system in such a way it might trigger a financial meltdown whenever excessive.

Uncertainty and the search for yield generate risk that is mainly harmful for the banking and the stock market sector although it might be beneficial as long as it is bound to profitability.

This issue has been delt with within the framework of the Basel frameworks and stock market prudential regulation as documented in Basel II through IV as well as Marzouki and Mehri (2022) about prudential surveillance in the Stock market.

But a lot has still to be achieved and reinvigorated under the scope of these purviews to afford better resilience from Risk and its implications.

Received: 06.01.2024 Accepted: 07.08.2025 Published:29.08.2025

Hedging from risk in the financial system cannot be ascertained because Hedging in the stock market is compromisingly involving the credit sector in excess risk and Hedging in the credit market which is claimed to be deployed through implementation of prudential restrictions as it amplifies excess volatility of share prices.

2.2 Risk Moments and Prudential Surveillance

Among the main shortcomings of the Basel frameworks stands the fact that its scope is to mitigate risk disrespectfully of its composition in structure but taking into account solely its nature either liquidity risk or credit risk or capital non adequacy.

But there should be room for consideration of moments of risk under the scope of risk supervision either ex-post for static risk assessment or ex-ante for early warning forecasting as risk is a random variable and the more it is dispersed in probability of occurrence the more it is unpredictable hence not subject to accurate framing and not accounted for in a precise way.

Thus a more appropriate goal for prudential surveillance should be risk moments framing and restrictions alongside mitigation of expectation of risk.

The perspective of risk mitigation should encompass risk mitigation of economic projects.

Alongside risk mitigation of risk coming from liquidity and credit risk from the banking perspective and excess volatility and hedging deteriorating consequences coming from trading of securities, it is clear that a perspective directed towards economic and business projects where project risk is divided into equity relative risk and external borrowing relative risk grasps the credit risk pertaining to the banking sector and one part of volatility in the share prices coming from disinformativeness with respect to share prices and profitability outcomes pertaining to the stock market sector.

In this respect, the moments of risk matter far more than its expectation provided risk is taken for a random variable.

There should be room to target a concise framing of risk moments for forecasting purposes as a prudential surveillance approach aiming at mitigating financial instability and vulnerability in a more concise way rather than solely mitigating risk.

Risk scoring should be proceeded to in function of all Risk moments, Mean, variance, skew and Kurtosis together with higher moments VAR value at risk and CVAR conditional value at risk and not only expectation and overall probability of occurrence.

Received: 06.01.2024 Accepted: 07.08.2025 Published:29.08.2025

It should be dynamic or time dependent in that it encompasses future Risk prospects ex-ante in function of early warning modeling.

If not Risk restriction lacks of accuracy and precision.

Hence prudential surveillance should focus on all Risk moments rather than barely Risk expectation.

This should be conducted disrespectfully of the fact that risk moments are endogenous in nature and that they are pertaining to projects being financed for the banking sector and equities being listed in the stock market sector.

In this respect, prudential surveillance has got the tools to restrict the banking and stock market intermediation but cannot restrict the risk tails and moments that are tributary to projects and equities independent from the service being provided by a bank or a stock market trading.

Prudential surveillance can mitigate risk assuming it displays features controlling its determinants.

It is easily proven that prudential surveillance can control contagion liquidity risk credit risk capital adequacy and excess volatility of stock markets.

But is it likely to affect the risk distribution and its moments? Can it affect the risk skew and Kurtosis and higher moments like Value at risk and conditional Value at risk?

It is consented that Variance Skew and Kurtosis are endogenous to risk tails.

Papers referring to the four moments optimization for risk return optimization which are Mean or expectation, Variance Skew and Kurtosis are like Harvey (2003), Kenalbay Ozut and Franko (2011), Beardsley Field and Xiao (2012), Saranya and Prasanna (2014), and Harvey Liechty , Liechty and Muller (2013).

As far as prudential surveillance is concerned and due to the fact that risk moments are endogenous to risk and cannot be restricted by a financial intermediaries, we state that the BSC, the auditing techniques and technical advising can help affect risk tails commensurately.

A comprehensive methodology of intervention proceeded by central banking and industry authorities can help limit and mitigate risk tails commensurately by reversing abnormal patterns by key entrepreneurial intervenient that might exhibit abnormal investment decision that translate into more imprudent risk tails in vertical integration through contagion.

In industries correlated vertically the risk incurred by the supplier is incurred by the retailer with an add up and propagation of risk biased by correlated patterns of skew and kurtosis.

Received: 06.01.2024 Accepted: 07.08.2025 Published:29.08.2025

Through the adequate fine tuning of the Balanced Score Cards and advising centralized at the relevant authorities of industry and Central Banking, there is room for containing abnormal behavior of risk tails that might exacerbate systemic exposure through adjustment of cross correlation among vertically linked industrial and commercial activities as well as uncertainty related to risk variance and its moments; skew and Kurtosis.

This can be adopted through benchmarking of similarity with observed risks dispersion from historical Balanced Score cards of enterprises as well as available performance of credit worthiness and risk scoring from the banking system and some past observations of share price evolutions and adjustments of accounting performance of listed enterprises to their market performance that are assumed to allow to go deeper into details and specificities of past risk tails.

2.3 A Mathematical Proof of The Prevailance Polynomial Structure of Variance of Risk Under Dynamic Distribution and Uncertainty

The Sheng and Yao (2014) stated about chance theory that: "Uncertainty and randomness are two basic types of indeterminacy. Chance theory was founded for modeling complex systems with not only uncertainty but also randomness. There are some important characteristics about uncertain random variables; the expected value is the average value of uncertain random variable in the sense of chance measures and represents the size of uncertain random variable. The variance is computed through chance distribution and inverse chance distribution. Thus, the expectation of uncertain random variable is the mean of values of the uncertain variable or its computed value. We assume in the following that E(uncertainty of R) can be taken for the dispersion of R or V(R) for simplification purposes.

If we assume that the expectation of Risk uncertainty is the variance of risk,

We find that the expression of the variance of risk is a polynomial of the expectation of risk with coefficients as functions of the parameters α and μ assumed since the definition of the structuring of risk.

This dynamic formulation is very common in Economics literature and is intended in finance to express dynamic financial phenomena.

In the financial economics literature, there is a consensus that there exists a positive relation between risk and return.

Nevertheless, the empirical findings so far have been contradictory.

Received: 06.01.2024 Accepted: 07.08.2025 Published:29.08.2025

These contradictions are the result of negative skew in the distribution of portfolio excess return and the fact that the estimation of intertemporal asset prices models are based on symmetric log likelihood specificities.

We begin with the basic definition of variance of risk assuming risk is a random variable.

Var (r) = Exp $((r)^2)$- $(\text{Exp } (r))^2$

And an extrapolation from the definition of Profitability Gap

Profitability Gap = Potential profitability – Actual profitability

= (Effectively likely risk)* (Measure of risk)

Assuming potential profitability is the remuneration of overall risk effectively likely risk is equal to (Risk – uncertainty).

As long as:

Risk = uncertainty + effectively likely risk (like in section 2)

Now the measure of risk is:

The cumulation of risk pertaining to credit activity, risk pertaining to excess volatility of stock markets and projects risk which is profitability gap.

Assuming μ is the risk return tradeoff coefficient which is not necessarily scalar

This leads to Profitability gap= (Risk- Uncertainty) * ((Risk premiuns-Risk of NPLs) +(Stock market index-principal component of SMI)+ μ Profitability gap)

Risk = Porf gap *(1/((Risk premiums-Risk of NPls)+ (Stock market index-principal component of SMI) +μ Prof gap)) + Risk Uncertainty

The expectation of profitability gap is a certain scalar α multiplied by the expectation of risk

The expectation of the multiplier for prof gap is 1/ (1+α*μ* Exp (Risk))

Exp (R)= Var (R) + α*Exp (R)/(1+α*μ*Exp(R))

Var (R) = E (R) - α*E (R)/(1+α*μ*E(R)) (0)

Var (R) = $E(R)^2 – (E(R))^2$ (1)

$E (R)^2$ = Var (R) + $(E(R))^2$

= Var (R) + $(\text{Var } (R) + \alpha E (R)/(1+\alpha\mu E(R)))^2$

= Var (R) (1+ Var (R) +2 $\alpha E (R)/(1+\alpha\mu E(R)) + \alpha^2E^2 (R)/(1+\alpha\mu E(R))^2$

Substituting into (1) gives

Var (R) = Var (R) (1+ Var (R) +2 $\alpha E (R)/(1+\alpha\mu E(R)) + \alpha^2E^2 (R)/(1+\alpha\mu E(R))^2 - E^2(R)$

Received: 06.01.2024 *Accepted: 07.08.2025* *Published:29.08.2025*

= Var (R) (1+ Var (R) +2 αE (R)/(1+αμE(R)) + α^2-1- $\alpha^2\mu^2E^2$(R)- 2 αμE(R)/(1+ $\alpha^2\mu^2E^2$(R)+ αμE(R)))

Setting expressions of Var R on the left handside yields

Var(R)* (1-1-Var (R)-2αE(R)/(1+αμE(R))=E^2(R)* (α^2-1- $\alpha^2\mu^2E^2$(R)- 2αμE(R)/(1+ α2μ2E2(R)+ αμE(R))

-Var^2(R)= 2Var (R) αE(R)/ (1+αμE(R)) + E^2(R)* (α^2-1- $\alpha^2\mu^2E^2$(R)- 2αμE(R)/(1+ $\alpha^2\mu^2E^2$(R)+ αμE(R))

Therefore

Var(R)= -2 αE(R)/ (1+αμE(R)) - E^2(R)/Var(R)* (α^2-1- $\alpha^2\mu^2E^2$(R)- 2αμE(R)/(1+ $\alpha^2\mu^2E^2$(R)+ αμE(R))

Var (R) = E (R) - αE (R)/(1+αμE(R))= E(R)(1- α/(1+αμE(R)))

The second expression leads to

E(R)(1- α/(1+αμE(R))) +2 αE(R)/ (1+αμE(R)) =- E^2(R)/Var(R)* (α^2-1- $\alpha^2\mu^2E^2$(R)- 2αμE(R)/(1+ $\alpha^2\mu^2E^2$(R)+ αμE(R))

Therefore

E(R) (1+ α/ (1+αμE(R)) = - (E^2(R)/ (E(R)(1- α/ (1+αμE(R))) * (α^2-1- $\alpha^2\mu^2E^2$(R)- 2αμE(R))/(1+ $\alpha^2\mu^2E^2$(R)+ αμE(R))

Simplifying both sides by E(R) leads to

1+ α/ (1+αμE(R)) = (1/(1- α/ (1+αμE(R))) * (α^2-1- $\alpha^2\mu^2E^2$(R)- 2αμE(R))/(1+ $\alpha^2\mu^2E^2$(R)+ αμE(R))

Now we make use of the notion of implicit differentiation with respect to E(R) both sides

The first term in the right hand side is denoted by f and the second term by g

The development of the implicit differenciation leads to

- $\alpha^2\mu$/(1+αμE(R))^2= f'g-fg' with respect to E(R)

- $\alpha^2\mu$/(1+αμE(R))^2 = (1/Var^2(R))* (2 $\alpha^2\mu^2$E(R) +2αμ)(1+ αμE(R)- α) (1+ $\alpha^2\mu^2E^2$(R)+2 αμE(R))-(1- α+ $\alpha^2\mu^2E^2$(R)+2 αμE(R))(($\alpha^2\mu$+ αμE(R)+(1+ αμE(R)- α)(2 $\alpha^2\mu^2E^2$(R)+ αμ))/(1+ αμE(R))

with introducting equation (0), Var(R) = E(R) – E(R)/(1+αμE(R)) to the right hand side and substituting by Var(R)

We take Var^2(R) to the numerator of the left handside and we develop the right hand side for E(R) then we replace Var(R) by y and E(R) by x

We find

Received: 06.01.2024 *Accepted: 07.08.2025* *Published:29.08.2025*

$Y^2 = 1/ (\alpha^2\mu\ x)^* (x^4(2\ \alpha^5\mu^5 + 2\ \alpha^4\mu^4\text{-}2\ \alpha^4\mu^4(2\text{-}\ \alpha)) +x^3(2\ \alpha^4\mu^4(1\text{-}\ \alpha\mu)\text{-}2\ \alpha^4\mu^4 +2\ \alpha^3\mu^3) +x^2(2\ \alpha^3\mu^2(1\text{-}\ \alpha\mu)\text{-}2\ \alpha^3\mu^3\text{-}2\ \alpha^3\mu^3(2\text{-}\ \alpha)\text{-}2\ \alpha^2\mu^3(\alpha^2\text{-}\alpha) + \alpha^2\mu^2(1+2\alpha\mu)) +x(-4\ \alpha\mu^2(\alpha^2\text{-}\alpha)+ \alpha\mu(1+2\ \alpha\mu))+2\ \alpha\mu(1\text{-}\ \alpha)\text{-}2\mu(\alpha^2\text{-}\alpha)$.

By using implicit differenciation once again with respect to x we find

$d(y^2/dx)= 2\ d(y/x)\ y$

$d(y/x) =-2x$ because $Var(R) = E(R^2)\text{-}E^2(R)$ hence $dVar(R)/dE(R)= -2E(R)$ as $dE^2(R)/d(E(R)=0$

assuming $E(R^2)$ is independent of E(R)

hence $-4xy =1/(8\alpha^2\mu x^2)^*(x^4\ A+x^3\ B +x^2C +xD +E)\text{-}1/(4\ \alpha^2\mu x^2)^*(x^3\ 4A+x^2\ 3B+x\ 3C+D)$

Therefore simplifying the above equation gives a polynomial function of fixed coefficients with respect to E(R) and various powers.

Hence, We have shown by a mathematical proof that the variance of risk is a polynomial function of the expectation of risk

This proof displays the merit to show that following this structure of risk like adopted under the purview of our structuring, realistic concerns about dynamic structure of risk are highlighted and theoretical assertions pervasive in the literature about the polynomial structure of dynamic complex systems like the risk structure and composition are verified.

Yu and Loskot (2022) stated that: " Polynomial distributions provide a superior flexibility over other canonical distributions, albeit at a cost of large number of parameters and the support interval is constrained to a finite range of values. The main advantage of polynomial distributions is that they can yield parameterized closed form mathematical expressions as well as offer a much greater flexibility in modeling time evolution of probability distribution for example when describing causal interactions in complex systems and modeling state transitions in dynamic systems"

The concise fathoming of risk distribution helps proceed to comprehensive early warning for the sake of making risk management serve for financial instability mitigation and ensure better resilience from the onslaught of financial meltdowns under the scope of better shaped prudential surveillance schemes.

This is due to the fact that once risk distribution over time based on time series data is better framed the issue of early warning gets more stringent and the likelihood of forecasting future evolution of risk gets better ensured which allows better forecasting of coming resilience from financial instability and better financial sectors' supervision in terms of systemic exposure.

Received: 06.01.2024 Accepted: 07.08.2025 Published:29.08.2025

3. THE BASEL FRAMEWORKS WEAKNESSES AND THE REQUIREMENT TO UNVEIL ITS SHORTCOMINGS

3.1. The Basel Frameworks Weaknesses

According to Borio and Crockett (2000), one of the vulnerabilities of the Basel II and III instruments mentioned in the literature is that the cyclical and structural dimensions are predominant, generating opacity, interconnectivity and complexity that get in the way of good prudential supervision.

The main instruments frequently used are:

Reserve requirements (RR), Loan-to-deposit ratio. (LTD), Counter-cyclical capital buffers (CCB), Internal Capital Adequacy Pricing (ICAAP), Interest rate risk in banking risk (RTIRB).m Loan-to-value ratio (LTV)

These instruments are taking the functional form of ratios which does not give precedence to economic concepts with concise analytical merits, such as the marginal effects analyses included in the (sensitivities).

The Instruments used would be static rather than dynamic in terms of dependence on the time factor.

The Functional Form undermines the merits of considering marginal impact effects with overriding implications for economic policy and economic analysis.

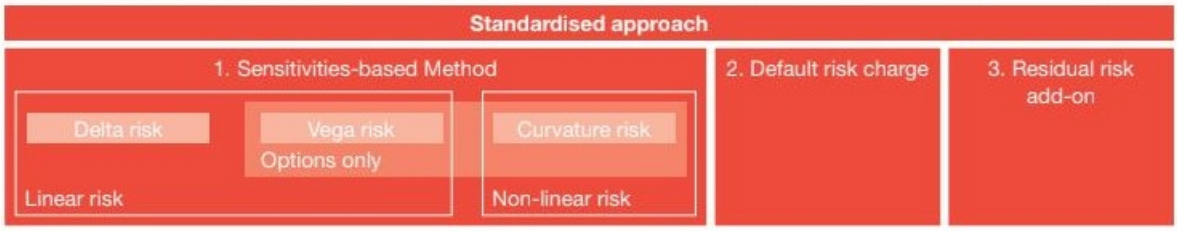
The instruments are shown to be unsuitable for short-term equilibrium cyclical adjustments (with the exception of counter-cyclical capital buffers) or long-term equilibrium longitudinal adjustments.

The relationships between financial stability and prudential instruments are implicit, and not materialized by concise quantitative estimates, but rather by PROBIT-type qualitative response models, which would be too non-contributory.

The main drawback of the Basel IV framework which is the so called revised standardized approach is that usually instruments are taking the form of probabilities (Risk measures) which are of low value (inferior to 1).

Received: 06.01.2024 Accepted: 07.08.2025 Published:29.08.2025

Fig. 5 Overview of the revised standardised approach



Delta: A risk measure based on sensitivities of a bank's trading book positions to regulatory delta risk factors.
Vega: A risk measure that is also based on sensitivities to regulatory vega risk factors to be used as inputs to a similar aggregation formula as for delta risks.

A risk measure which captures the **incremental risk** not captured by the delta risk of price changes in the value of an option.

A risk measure that captures the **jump-to-default risk** in three independent capital charge computations.

A risk measure to capture **residual risk**, i.e. risk which is not covered by the components 1. or 2.

- Calculation of three risk charge figures based on **three different scenarios** on the specified values for the correlation parameter.
- The bank must determine each delta and vega sensitivity based upon regulatory pre-defined shifts for the corresponding risk factors.
- Two stress scenarios per risk factor have to be calculated and the worst scenario loss is aggregated in order to determine curvature risk.

It is obvious that, the computation of the three risk charge figures Delta, Vega and the curvature risk as for the sensitivities based method pertaining to the discrepancies from the regulatory framework in terms of sensitivity alongside with the default risk of NPLs and the residual risk require an extrapolation based on three different scenarios on the specified values for the correlation parameter alongside with the jump to default risk and the residual risk.

The first critic to assert about this conventional framework is that, empirically, these correlation parameters are extracted from estimations of elasticities of the kind in Genc (2012) where there are four possibilities for formulations of elasticities each with a certain adequacy and goodness of fit depending on the value of the elasticity per se.

Eventually, with computations of sensitivities there would have been no problems. But still a main hindrance to the computation of the sensitivity is the specificity of the mathematical formula that requires having discrete functions that are derivable in mathematical analysis. If not estimation of the elasticity or computation of the economic simplification assumption is required.

The authors as documented in Banks and Al (1997) find that for values of sensitivities that are low it is that the approximation of the sensitivity ; the one that is commonly used in economics which is $e(A/B) = (\Delta A/\Delta B * B/A)$ performs better than any estimator corresponding to their estimation technique and to any oter estimation technique like the ECM (Error correction modeling) or ARDL (Autoregressive dynamic lags) by Perasan and Shin (2001).

Received: 06.01.2024 Accepted: 07.08.2025 Published:29.08.2025

Hence, due to the fact that it still stands approximate it is not a very concise estimator of the market risk which is the Basel IV sensitivity based instrument of the standardized approach based on sensitivities of market risk either linear or non-linear .

One main additional drawback or the second critic to be asserted is that the risk measures are not balanced in their formulations meaning that a sensitivity in numeric differs widely from a default risk computation which creates a mismatch in descriptive statistics and might result in neglecting the effect of sensitivities computations in variation.

A sum of three items should ascertain they have the scope of providing the same functional form to ascertain a balance in their scope.

The last critic is that no reference to risk moments is accounted in the Basel framework even though their effect on evolution of risk either ex-post for actual risk assessment or ex-ante for early warning assessment reveals of rudimental importance to better shape prudential intervention or supervision.

3.2 The Requirement of Unveiling Basel Framework Shortcomings

It is obviously pre-required in terms of resilience from the onslaught of financial crises to tackle the root items lying behind financial instability in each sector.

Therefore, it is seemingly inaccurate to base resilience from financial instability on the Basel framework whose aim is specific to mitigating financial instability that affects the credit sector.

As a matter of fact, although financial instability pertaining to the credit sector is of commensurate importance and relevance, it still stands that a lot has to be achieved in terms of resilience from Stock market risk or financial instability coming from excess volatility of share prices as they might herald the onslaught of a Stock market crush for whom an adequate and specific prudential surveillance framework should be engineered and adopted for the sake of avoiding financial vulnerability that comes from excess volatility of share prices and might be exacerbated by a Stock crush or excess bullish slope of the stock index that might be due to excessive speculation.

Excessive speculation is in many instance is abrupt meaning it might erupt unexpectedly and in other cases it is predictable by the cross correlation of share prices that present a comparable pattern of evolution and might move in parallel which is a signal of a vulnerability that requires more scrutiny and to be covered in a section that will flow.

Received: 06.01.2024 Accepted: 07.08.2025 Published:29.08.2025

As far as the use of ratios that are seemingly neglecting key features of economic functions allowing for structural and conjectural analyses and marginal effects calibration, there still stands that a PhD dissertation presented in (2022) by M Miras Marzouki still unpublished that discussed complementary instruments to Basel II and III framework and that used a sensitivity approach based on a macroeconomic perspective which presumably performs better in terms of estimation with high values of sensitivities that according to Banks (1997) provide estimators with more accuracy than the approximation commonly used in economics that would be a must as an estimator for the Basel IV standardized approach.

For these estimations the PhD dissertation entitled : « A theory of financial strategic foresight and prudential engineering: Case of Tunisia » used the estimation method ARDL autoregressive dynamic lags for time series regressions and BOUND tests for long run early warning systems.

As far as the qualification of financial stability is concerned, it should be pointed out that this is a phenomenon that can be qualified rather than quantified, and which consequently requires qualifiers aimed at determining it, or phenomena closely related to it such as (MP efficiency, banking system efficiency, borrower solvency, crowding-out effect, etc.) rather than effects as enshrined in conventional instruments (capital buffers, reserve requirements, liquidity risk ratios, etc.).

The sensitivities to be proposed can be interpreted as phenomena, whereas the conventional Bale ratios are effects, which would be ill-suited to qualify a non-quantifiable phenomenon such as financial stability, if not by a qualitative response model of the PROBIT type, with two alternatives - one to confirm stability and one to deny it - which would be insufficient to qualify financial instability Basel IV framework is based on a sensitivity approach with a methodology based on market risk assessment extracted what is called uncertainty microeconomics.

In definitive, as much as this subject is concerned there is a lot of skepticism concerning functional forms and theoretical meanings of adopted prudential instruments that raises a debate on effectuality of making accurate use of them when dealing with resilience from onslaught of financial meltdowns.

Still it stands that overall these are meant to exclusively deal with systemic exposure that emanates from the banking sector whereas prudential surveillance is meant for mitigation of financial instability root items.

Received: 06.01.2024 Accepted: 07.08.2025 Published:29.08.2025

Those are not necessarily originating from the banking sector but can eventually occur in the Stock market sector due to excess volatility of share prices that can exacerbate market risk far beyond tolerable to ensure stability of the financial system or what can emulate from the risk of onslaught of Stock market crashes eventually whose probability of occurrence increases with excess volatility of Stock share prices.

Therefore, a lot of criticism should be conveyed to the Basel framework in general and there is a lot of doubt as to whether it is an effectual prudential framework that can ensure effective resilience of financial stability and mitigate systemic risk to the financial system.

An issue of prominent relevance for the subject matter is about investor risk appetite for whom a lot of concern should expressed as to whether it is pro-cyclical with the business cycle counter-cyclical or a-cyclical because business cycle effects play a predominant role in terms of the effect of economic performance on financial stability at a first place and as long as monetary policy is intended primarily for price and output stability there is much concern about the effect of business cycle fluctuations on the interaction between prudential policy and monetary policy.

3.3 Risk Mitigation and Variance of Risk Attenuation

Among the main shortcomings of the Basel frameworks stands the fact that its scope is exclusively to mitigate risk.

But there should be room for consideration of variance of risk assessments and framing as risk is a random variable and the more it is dispersed in probability of occurrence the more it is unpredictable hence not subject to accurate consideration and not accounted for in a precise way.

Thus, a more appropriate goal for prudential surveillance should be risk variance framing alongside mitigation of expectation of risk as currently adopted and also it should consider targeting forecasting of future evolution of skew and kurtosis of risk tails as they reveal of rudimental relevance for the assessment of future evolution of risk.

Alongside risk mitigation of risk coming from liquidity and credit risk from the banking perspective and excess volatility and hedging deteriorating consequences coming from trading of securities, it is clear that a perspective directed towards economic and business projects where project risk is divided into equity relative risk and external borrowing relative risk grasps the credit risk pertaining to the banking sector and one part of volatility in the share prices coming from disinformativeness with respect to share prices and profitability outcomes pertaining to the stock market sector.

Received: 06.01.2024 Accepted: 07.08.2025 Published:29.08.2025

As long as project risk should be conveyed more impetus adequate concern should be directed towards variance of risk as mainly expectations have dispersed probabilities depending on what performance really occurs.

Hence it matters a lot how would realizations of earnings happen to be per se and compared to each other.

Project risk should be considered rather from the perspective of variance of risk rather than risk in itself.

In this respect the variance of risk matters far more than its expectation provided risk is taken for a random variable.

3.4 An Application of The Expected Shortfall Measure To Stock Market Risk

Weaknesses in Risk measurement and assessment: The concept of systemic shortfall:

Risk management tools that operate through measurement are aimed at enhancing financial stability and efficiency through computation of basic macro-prudential instruments, for instance.

In 1996, the Basel accord amendment introduced the Value at Risk risk measurement tool as the standard measure of risk as well as the fundamental risk metrics used to determine the regulatory capital requirement.

Hull (2012) defined the Value at Risk or VaR as:

“An attempt to provide a single number that summarizes total risk in a portfolio”.

But due to several weaknesses found in VaR measurement, such as its “incoherency” and its inability to capture “tail risk” the Basel committee has agrred to use an alternative measure to calibrate risk along the capital requirement. As a matter of fact, in 2012 it issued the notion of «expected shortfall”.

According to Acarbi and Szckely (2015) : « expected shortfall is the average of losses that are larger than VaR which implies it has the ability to capture tail risk and offers other advantages such as addictivity, mathematical tracability, uniqueness and uses the same risk models. »

Among its weaknesses that have been detected and still not resolved up to the present is that it cannot be “backtested”.

This feature is of paramount importance for the validity and viability of the model in capturing risk as it is closely linked to its abilityto provide forecasts.

Acerbi and Szchely (2015) stated that:

Received: 06.01.2024 Accepted: 07.08.2025 Published:29.08.2025

"Backtesting is a test used to ensure that the model yields forecasts that are in line with the actual realities in other words it is used to check the validity and viability of the model in capturing risk".

This misconception of backtesting has become the root obstacle for the Basel committee to fully implement Expected shortfall as the standard regulatory risk measure. Indeed, they found out that"ES cannot be used to rank different point forecasts in a decision theoretically way" as stated in Ziegel (2014).

Summing up the above-mentioned analyses about the standard regulatory frameworks methodological approaches of risk capturing and prudential instruments setting in Basel II and III agreements, it is obvious that these regulatory frameworks should be subjected to partial reconsideration and up grading if not full reconsideration with an ulterior engineering methodology of newly set instruments paving the way for a full grasping of the pre-requirements for an adequate implementation of the must of risk mitigation and financial vulnerability attenuation as purported by the Basel committee but through an other perspective of instruments setting and modeling.

The need for Backtesting and a general appraisal of Basel framework shortcomings

The attempt made by the Basel IV framework about upgrading the expected shortfall about market risk has displayed many advantages drawing the wedge between the requirement of backtesting various point estimates through the mention of the key features of risk suggestible to three scenarios.

The three risk charge figures which are namely the Delta Vega and the incremental risk require an extrapolation based on three different scenarios on the specified values for the correlation parameter.

These key risk factors are the key contribution of Basel IV and still represent a shortage in terms of complexity, interconnectiveness and opacity like stated by Borio and Crockett (2000)

Besides and most obviously there is an urgent call of complementing the entire prudential framework aimed at insulating the credit market from market risk summarised in credit and liquidity risk in brief to deal with a market risk emanating from an other financial sector.

These are under the purview of the scope of Stock market prudential engineering presented and discussed later in the paper in Section 4.

Received: 06.01.2024 Accepted: 07.08.2025 Published:29.08.2025

3.5 Early Warning as a Prerequisite For Unveiling Future Threats To Financial Stability

Early warning in prudential surveillance is assumed to prompt forward guidance of key time dependent and financial instability related items in a way that dismays future exposure to financial meltdowns. Prudential as instruments as for Basel II and III and even those sensitivity based of Basel IV are bound to shortsightedness in that they target the short run. They do not display features that shields for expected futures exposure to financial meltdowns or sources of systemic exposure.

According to us there should be room for conducting co-integration or Bound tests for variables that are not stationary of the same order like in Perasan and Shin (2001) for Delta, Vega and the residual risk and the default risk at least if not as a minimum requirement to be conditional on further analyses such as Markov switching modeling and related jump effects tracing for Basel IV framework of additional instruments.

The Bound test should test for the long run relationship with a benchmark risk sensitivity which is the willingness of the banking system to bear excessive risk for the search for yield motivation which is the sensitivity of new production of credit to the private sector to money market rate or e(NCPS/MMR).

Henceforth with an implicit testing for co-integration or Bound testing, we ensure that early warning is available in that the prudential regulator is alarmed in advance from future threats whenever over the long run the various types of risk ; Delta, Vega and the residual risk for market risk have long run relationships with the benchmark risk that expresses the Imprudence of the banking sector in terms of risk exposure for a search for yield motivation.

The rationale for the chosen benchmark for excessive risk is that private credit bears excessive risk exposure and is beneficial in terms of profitability for banks.

Yet the reasoning that early warning should prevail is also valid for upgrading Basel II and III as even this framework is shortsighted in that it does not proceed to early warning for the sake of ensuring resilience from the onslaught of financial meltdowns stemming from financial instability with early warning or in advance what requires adopting long run relationship testing as available in co-integration and Bound testing.

conditions.

Received: 06.01.2024 Accepted: 07.08.2025 Published:29.08.2025

4. A PRIMER TO INTERACTION ACROSS FINANCIAL SECTORS; THE ISSUES OF FINANCIAL ACCELERATOR AND BORROWERS' CREDIT WORTHINESS OF CORPORATIONS

4.1. The Financial Accelerator

According to Fender Ingo (2000), "The concept of financial accelerator derives from informational asymmetries in the credit markets which drive a wedge between the costs of external and internal finance. In particular the higher cost of external finance reflects the agency costs of lending under asymmetric information. In such a situation internally generated funds enable firms to reduce their demand for costly external finance. Hence a fall in a borrower's net worth or cash flow raises the demand for external finance and subsequently reduces investment".

Given that negative shocks affect cash flows individually the effect of an initial shock to the economy is amplified. Small shocks might therefore create large cycles hence the term financial accelerator.

A restrictive monetary policy shock now reduces investment spending through the traditional cost of capital effect and given that changes in interest rates affect corporate cash flows lowers a firm's cash flow and its ability to borrow. Consequently, monetary policy impulses are reinforced by cash flow effects.

In the way literature the Modigliani Miller theorem (1958) states that financial structure is irrelevant to corporate investment decisions.

More recent research however has questioned the assumption of perfect substitutability of external and internal funds by pointing to the existence of capital market imperfections. The most common argument posits that asymmetric information and problems of contract enforcement lead to the emergence of agency costs thereby driving a wedge between the cost of external and internal finance. As outside investors require a premium for unobservable risks, external finance becomes more costly than internal finance.

The issues of NPLs and Borrowers' credit worthiness is closely linked to financial stability. They bind banking sector profitability and credit risk in a fashion that triggers financial meltdowns and exacerbates economic performance slowdown.

Received: 06.01.2024 Accepted: 07.08.2025 Published:29.08.2025

According to Podpiera and Weil (2008) "from the 1990s up till the early 2000s a large number of banks in emerging economies collapsed owing to high non performing loans and worsened cost of efficiency.

This indeed was observed in balance sheets of banks in both emerging markets and advanced economies where NPLs were found to be major bottlenecks to their profitability".

According to Abiola and Olausi (2014) and Richard and Al (2008) "the failure of effectively monitor non performing loans or reduce high levels exceeding set thresholds may lead to insolvency."

Biabani and Al (2012) added "when a relatively large number of banks have NPLs surpassing their capital, banks crisis can follow which in the long run leads to a financial crisis".

Thus the root threats to financial stability are fathomed through a quantitative assessments of NPLs credit risk and borrowers credit worthiness at the banking sector level which lead us to adopt the perspective of the banking sector aggregates, and data to assess credit worthiness rather than at the individual bank or borrower.

The concept of information asymmetry was first posited in the seminal work of Akerlof (1970) in which the paper claimed that the existence of uneven dissemination of information between transacting parties resulted in an imperfect market.

According to Stiglitz (1981) "Information is imperfect and obtaining information can be costly. The extent of information asymmetry is affected by the actions of firms and individuals".

Kemei and Korengo (2014) attributed "high non performing loans in banks to lack of information".

Dell'aricca (2001) noted that "if the banks could effectively determine the Creditworthiness of borrowers deserving borrowers could get the credit facilities thereby reducing the high rate of loan default.

Conversely an adverse selection exposure whereby high risk borrowers displace Creditworthy borrowers could cause deterioration in overall bank loan portfolio leading to a buildup of NPLs".

Borrowers' credit worthiness is defined as e(NPL/Br) where NPL stands for Non Performing loans and Br for borrowing rates.

This measure which is e(NPL/Lr) is a sound proxy for borrowers credit worthiness because it is a signal of the extent of matching between the true risk entailed by borrowers and the computed risk encompassed in risk premiums accounted for in loan rates. It measures the matching between

Received: 06.01.2024 Accepted: 07.08.2025 Published:29.08.2025

risk premiums accounting for the risk taken into consideration by banks and the actual risk as being implicit in the measure of non performing loans.

If this elasticity increases this means that as risk premiums increase, NPLs are more sensitive to borrowing rates which makes borrowers more credit worthy and most of borrowers credit worthiness accounted for in risk premiums. Banking rating is not random or is strongly correlated with project expected profitability. There is precise rating and risk notation.

If this elasticity decreases this means that as risk premiums increase, NPLs are less sensitive to borrowing rates which makes borrowers less credit worthy and most borrowers credit worthiness not accounted for in risk premiums. Banking rating is random or weakly correlated with project expected profitability. There is a bad rating and risk notation.

Our method consists in taking borrowers credit worthiness into account from a banking sector perspective for the scope of enhancing credit sector resilience to systemic risk and financial instability.

In doing this, based on a sensitivity analysis approach, we try to interpret the sensitivity of Non performing loans to the average cost of borrowing and find out it is a fairly performing benchmark on the seriousness of the borrowers in terms of predisposition to refund the loan.

It is based on the reference in the literature about the qualification of the sensitivity of borrowers to high borrowing rates according to which borrowers should not accept high borrowing rates if not they are not willing to refund the loan.

The elasticity of non performing loans to loan rates represents an expression of the sensitivity of NPLs to loan rate increases.

It is an expression of the quality of investors selection with respect to the average cost of borrowing.

As a matter of fact, If investors are more sensitive in NPLs to increases in loan rates they are good quality investors meaning that they are not likely to incur higher borrowing costs and neglect the likelihood of non repaying their loans.

The stake of risk entailed by their financed project is accurately taken into account by the risk premium.

If investors are less sensitive in NPLs to increases in loan rates they are deemed to be bad quality investors meaning that they are likely to incur higher borrowing costs and neglect the likelihood of non repaying their loans.

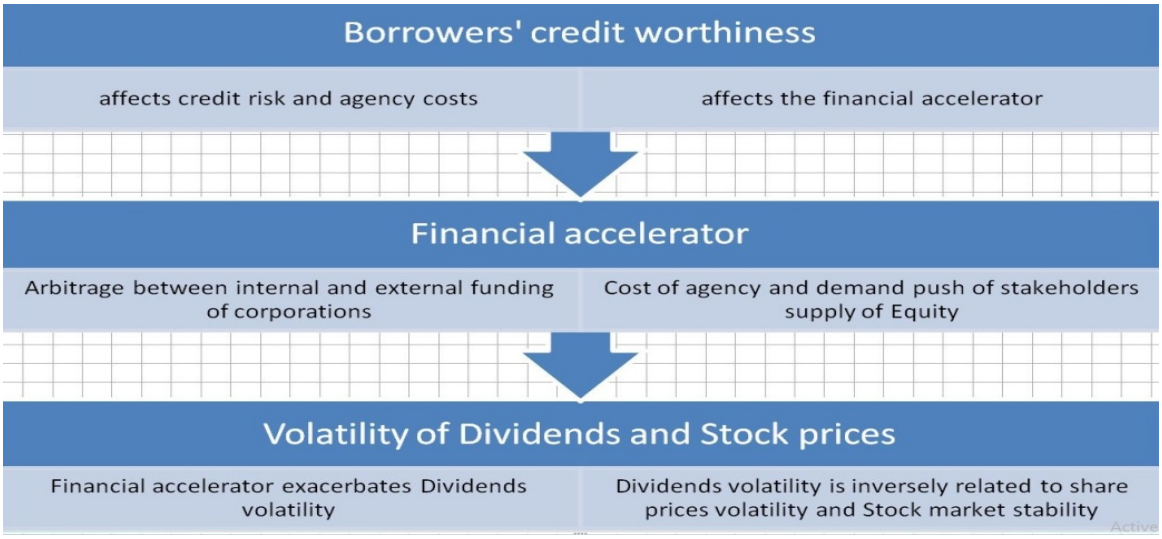
Received: 06.01.2024 Accepted: 07.08.2025 Published:29.08.2025

The stake of risk entailed by their financed project is not accurately taken into account by the risk premium. Because of adverse selection borrowers have the tendency not repay their loans whenever borrowing rates increases do not affect their expected ability to repay the loans.

The more NPLs are elastic to borrowing rates or risk premiums the more investors are good quality investors.

This method is prospective in that it is geared toward future assessment to be valid for expectations about the impact on financial stability in the future. It is not based on historical assessments bearing information assymetries such as free riding by taking future qualifications based on past assessments although it is based on time series regressions forecasts take actual and future determinants into account in the equations.

Chart 1 : Volatility of Dividends and stock prices and the financial accelerator :



INTERPRETATION

This graphic representation shows the linkages between credit sector key items of prominent relevance for credit market financial stability and key factors of prominent relevance for the Stock market financial stability which is volatility of dividends of Stock prices that according to the CAPM is inversely proportional to the volatility of share prices.

4.2 The Super-Multiplier:

J R Hicks (1950) has interacted both the multiplier effect of Keynes and the accelerator effect of Aftalian with a view of measuring the total effect of induced investment on income.

Received: 06.01.2024 Accepted: 07.08.2025 Published:29.08.2025

The combined effect of multiplier that works converse to crowding out and accelerator is the so-called leverage effect or the super-multiplier effect.

P A Samuelson (1939) in his article about the interaction between the multiplier and the principal of acceleration and J R Hicks later in (1950) have made successful attempts to integrate the two concepts of financial acceleration and Keynesian multiplier which works converse to our crowding out effect matter and thus introduced remarkable improvements in the theory of economic growth.

They stated it is important to analyze the combined effects or leverage effect or super-multiplier effect on national income propagation.

The combination of autonomous and induced investment is a better expression of this super-multiplier as stated by Hansen.

The relevance of the super-multiplier to prudential matters stems from the fact that it draws a wedge between financial instability as portrayed by excess volatility of stock prices and macroeconomic performance that affects companies net worth and reverses back to the matter of prudentiality through the leverage effect and the tradeoff of equity financing and external borrowing.

As far as this arbitrage between various sources of financing for corporations is concerned the banking sector liquidity and credit risk features are quite intricating with respect to the setting of the cost of borrowing for corporations.

Thus all these aspects of financial accelerator super-multiplier and market risk are commingled to feed back into excess stock prices volatility and fuel financial instability and the requirement of limiting it through prudential intervention either in the credit sector or the Stock market sector .

4.3. The Balanced Scorecard and Its Implication on The Integration of Financial Sectors

The Balanced Score Card is a key concept for the integration of financial sectors.

According to Abdali (2013) « The integration between performance and risk management enables organizations to both monitor and evaluate the performance effectually through the balanced scorecard and to prevent further unfavorable consequences resulting from uncertain performance ».

Gordona, Loeba and Tseng (2009) discussed the new trend in viewing the risk management. They noticed the new trend of holistic view of risk management which is commonly referred to as enterprise risk management (ERM).

Received: 06.01.2024 *Accepted: 07.08.2025* *Published:29.08.2025*

According to them: «Five factors have an impact on the ERM. These factors are; the environmental uncertainty, the industry competition, the firm complexity, and its size and the Board of directors' monitoring »

These factors fall into the scope of rational assessment of investment by traders in the secondary market.

Their assessment is intended to depict expected beneficial investment opportunities and does affect fluctuations of the Stock market index with pikes and troughs.

But as far as financial stability pertaining to the stock market is concerned, it still stands that the key factor or criterion of prominent relevance for excess volatility of the Stock market index which is compromising for financial stability is the cross correlation between share prices which is not available in the BSC. Nonetheless the BSC can provide a clue about the patterns of the Stock market index and henceforth through the diversification of trading for the sake of disentangling the traders from the commonly followed behavior that binds the average trend of the stock index.

This has the effect of dampening excess volatility up to a certain limit.

Bu it is yet uncertain how far does the portfolio diversification of rational investors affect excess fluctuations and how far it affects excess volatility.

Anyway, the BSC is expected to provide a clear assessment of expected risk and uncertainty about future corporations' performance financially and non-financially.

As far as the BSC is concerned Beasley, Chen Nunez and Wright (2006) put an emphasis on the potential benefits of developing a set key risk indicator KRI.

They stated that: « The potential value of KRI may be derived from different contributions such as risk appetite by determining an appropriate threshold for action at different organizations levels. Risk and opportunity identified by designing KRIs to alert management to trends that may affect the achievement of organizational objectives or may introduce new opportunities. Risk treatment by serving mechanisms for organizational units and Risk reporting by providing measurable data conclusive to aggregation »

These features fall into the scope of annihilating the cross correlation among share prices as they display for the trader the required tools to diversify his trading strategy so that it gets disentangled from mass comparable trading strategies that not only motivate cross correlations among share prices but also minimize expected earnings as they are shared opportunities rather than innovations in depicting favorable opportunities most expected to be beneficial.

Received: 06.01.2024 *Accepted: 07.08.2025* *Published:29.08.2025*

The BSC draws a wedge between unveiling the risk management root items and hence the creditworthiness of the corporation into consideration and its effect or contribution in credit risk or risk of non-performing loans for the credit sector which is a building block of financial instability from the standpoint of the credit sector and the rational information gathering sources for traders in the Stock market that involves efficiency and stability whereby as stated earlier efficiency of the stock market is related to its stability.

Nevertheless it still stands that financial stability ffrom the stock market perspective is compromised by excess volatility of stock prices whose fluctuations are essentially due to cross correlated stocks i.e stocks that vary in the same direction once a perturbation occurs.

Besides basically financial stability from the stock market standpoint is threatened by irrationally based trading or trading that is more likely to be beneficial and lead to a bandwagon effect of following up or what we might call a speculative attack that compromises tremendously stock market stability.

The balanced scorecard affects considerably the MBV and by of consequence Stock market efficiency.

It is also obvious that it affects excess volatility of share prices even if there are claims that investor trading patterns are driven by sentiment and irrationally cast patterns of purchasing and selling of Stock.

The BSC ensures that an adequate assessment of risk aspects pertaining to corporations can exhibit future patterns of profitability and by a way of consequence make information accessible to traders more adequate and less asymmetric fact that ensures least volatility in face of clear foresightedness of future profitability expectations.

Thus, affordability of a reliable balanced scorecard in itself can help mitigate financial instability provided the irrationality of traders is rational up to a certain point which is not guaranteed.

As a matter of fact, disrespectfully of the fact that the risk assessment of an entrepreneurial activity of a quoted corporation is trivial for financial stability pertaining to the Stock market sector it still stands of commensurate relevance for financial stability considerations pertaining to the credit sector.

Received: 06.01.2024 Accepted: 07.08.2025 Published:29.08.2025

Indeed, borrowers' credit worthiness and credit scoring which are of prominent relevance for credit risk assessed by banks, the BSC provides key information of prominent relevance for unveiling uncertainty for risk assessment by the credit sector.

By a way of consequence, the assessment of borrowers' credit worthiness becomes more accurate and credit risk which is proportional to financial instability is attenuated.

The interaction between the stock market sector and the credit sector is better fathomed once we settle an accurate and precise BSC.

This is essentially due to the fact that rational assessment of corporations by traders in the stock market goes in parallel with the corporation’s solvency and its credit worthiness vis-à-vis the bank or the loan supplier which affects financial instability of the credit sector and eventually borrowing costs subject to risk premiums assessments.

Excess volatility of stock prices results from cross correlations between stock prices fluctuations and not excess risk entailed by the corporations’ operations.

As long as risk is taken into consideration especially if it is clearly specified In the balance scorecard investor trading behavior becomes rational subject to objective assessment.

By a way of consequence earnings prospects are attenuated considerably except for those investment opportunities that surprise the market.

Indeed, these beneficial trading opportunities cannot be involving the concern of rationally guided investors that analyze objectively their investment opportunities based on available information including the balance scorecard.

Nevertheless, it still stands that the better shaped is the BSC the closer is the MBV (market to book value) to 1 and the more efficient is the stock market.

beyond.

5. EARLY WARNING SYSTEMS, LONG RUN PRUDENTIAL SURVEILLANCE AND MARKOV SWITCHING REGIMES

The process is as follows:

Ensuring a stable income stream is a priority for banks maintains resilience from the onslaught of liquidity risk that triggers credit risk.

Received: 06.01.2024 Accepted: 07.08.2025 Published:29.08.2025

Indeed, as continuous profitability decreases liquidity behaves as well. This drives the bank motivated by the search for yield motivation to incurring more risk because risky assets bear more risk premiums that increase profitability and this exacerbates financial instability.

A rule of thumb in financial management consists in ensuring stable future income streams to diminish future liquidity or turnover risk.

Therefore, maintaining continuous stable income streams through ensuring a ceiling on long term debt dissuades the bank in advance to incur the hindrance of supporting a risk return tradeoff later in what we call an early warning procedure to avoid future vulnerability and foresightedness about stable income streams.

Early warning in the stock market occurs by smoothing the super-multiplier effect.

This can be eased through inciting long term placement either by following the Board of Governors of the Federal Reserve System (2023) that call the urge for ensuring long term debt obviously through decreasing the cost of long term debt and thus increasing the cost of long term equity financing which occurs through the financial accelerator effect or through adding favorable extra conditions for long term stakeholders through allowing them for benefiting from more governance and bargaining power on corporations management policy.

The effect would be decreased share price volatility over the long run and henceforth mitigated financial instability.

Smoothing the super-multiplier effect requires capping the long-term borrowing rate and in parallel ceiling the long-term placement dividend rate So that share prices volatility is decreased in synchrony with ensured long run income streams for the credit sector.

And hence stability of both financial sectors is ensured

5.1 Currently Adopted Early Warning Systems

In parallel to early warning measures, federal agencies have provided lately supervision requirement for large banks to maintain long term debt to ensure resilience from losses and financial stability as stated by the Board of Governors of the Federal Reserve System (2023).

Received: 06.01.2024 Accepted: 07.08.2025 Published:29.08.2025

Table 2: Approaches to supervisory risk assessment and early warning systems – generic features

	Assessment of current financial condition	Forecasting future financial condition	Use of quantitative analysis and statistical procedures	Inclusion of qualitative assessments	Specific focus on risk categories	Link with formal supervisory action
Supervisory ratings						
- on-site	***	*	*	***	*	***
- off-site	***	*	**	**	**	*
Financial ratio and peer group analysis	***	*	***	*	**	*
Comprehensive bank risk assessment systems	***	**	**	**	***	***
Statistical models	**	***	***	*	**	*

* not significant
** significant
*** very significant

These approaches fall under the scope of foresightedness and early warning as mainly most prudential measures of Basel II, III and IV target the short run and are intended to mitigate financial instability over the short run.

We will focus on the three columns; forecasting future financial conditions, the use of quantitative analysis and statistical procedures as well as the inclusion of qualitative assessments.

Indeed, in the referred to literature as stated in Sahajwala and Bergh (2000) there are three main types of early warning systems:

-Scoring models of credit rating and awareness notation in instance

- Qualitative response models of the type logit with two outcomes. This type of early warning models although relying on strong theoretical assumptions lacks contribution in terms of interpretation of endogenous variables as they have two outcomes of the type pass or fail

-Artificial intelligence models currently used by several prudential authorities of the G10 countries

We propose with reference to the sensitivity based modeling discussed above a quantitative response models whereby the sensitivity expressing an impact effect is regressed in a time series regression for forecasting purposes. Once it is interpreted the values of the sensitivity explained provide a vast array of likely solutions to be interpreted accordingly to its interpretation.

This method clearly outperforms the two first methods although Artificial intelligence models are claimed to be very effectual but they remain essentially not statistical in nature or based on quantitative econometric analysis and forecasting which might be troublesome in terms of economic and financial interpretation.

Received: 06.01.2024 Accepted: 07.08.2025 Published:29.08.2025

For such contributive value the notion of sensitivity is a clue that annihilates disinformation about the quality of future key variables in that it displays the main feature through its merits of qualifying impact effects to show in quantitative response models qualitative information.

For example the sensitivity of new credit supply to the private sector to the money market rate is measurable as a quantitative variable and qualifies at the same time the notion of willingness of the banking system to bear excessive risk disrespectfully of the fact that it provides information on whether indeed the banking system would be willing to bear excessive risk or not.

Sensitivities should be modeled for the sake of setting early warning systems taking everything else equal about the method adopted for long run correlation or forecasting or whether Artificial intelligence should be adopted or not.

Besides for early warning purposes a deep concern should be directed toward fathoming risk distribution and moments in order to permit to draw a certain pattern of future evolution of dispersion probability of risk expectation and to have better shaped clues about skew and Kurtosis that show where distribution is biased in the present and future if time series are adopted.

The accurate fathoming of risk distribution permits to forecast in advance the interval of risk dispersion provided it is subjected to adjustment with respect to the variable items that are encompassed in its expression the uncertainty item the business cycle related item and the stable item.

5.2 Markov Switching Regimes for Jump Effects

One main feature of key salient instruments is that they are subject to a Brownian motion process or a jump process like credit risk as stated in Tak Kuen Siu (2010) where he discussed a Markov Regime Switching Marked Point Process for short rate analysis with credit risk where he emphasized that it is of commensurate importance to take into account jumping processes such as Markov switching regime processes because their adverse implications herald unexpectedly.

Therefore, as long as we discuss early warning, alongside the conventional time varying long run relationship as imbedded in co-integration and Bound tests, there should be room for testing for Markov switching regimes or brownian processes to be forwarded guided with respect to jump effects that herald unexpectedly for Markovian switching regimes and Brownian motions that are probabilistic and statistical phenomena with continuous innovations through time.

According to Tak Kuen Siu (2010) « Some information items such as surprise information and extraordinary market events may have large economic impact on short rates and cause jumps ».

Received: 06.01.2024 *Accepted: 07.08.2025* *Published:29.08.2025*

He reiterated that: « Short rate models based on Brownian information flows may not be appropriate to describe large movements. Jump diffusion processes or related processes incorporate large jumps such as Markov switching regimes »

Thus, it is obvious that the kind of Markov switching regimes for credit risk or liquidity risk or rather illiquidity risk is not forecast able by conventional short run instruments toolkits that are especially targeting financial instability mitigation for the sake of abiding contingencies of the onslaught of financial meltdowns that might erupt abruptly and unexpectedly.

5.3 The Requirement of Backtesting

The most important item in early warning is back-testing which is a type of retro diction and cross validation applied to previous time periods.

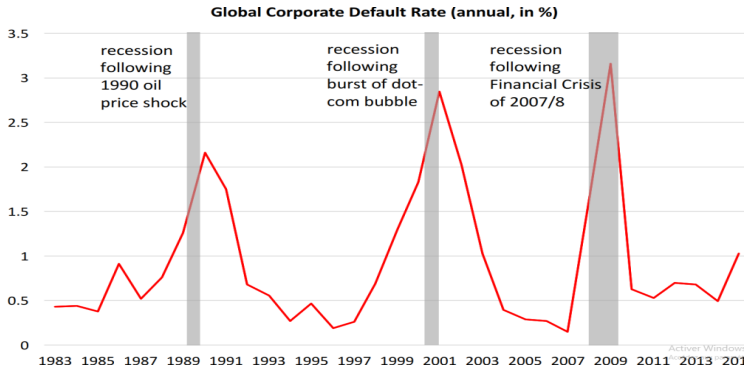
This procedure aims at drawing patterns for risk items that overlap and reproduce in order to better shape early warning.

Modeling should be quantitative to provide concise parameters and phase shifts more likely than qualitative log-odds to frame the interval of evolution of predictions of risk and its moments.

Even risk moments should be subjected to back-testing because probability distribution shows likelihood in a certain time point whereas back-testing them might show a pattern of reproduction not depictable through probability distribution.

6. NON-PERFORMING LOANS, INFORMATION ASSYMETRIES AND BORROWERS CREDIT WORTHINESS EFFECTS ON PRUDENTIALITY AND RISK

6.1-NPLs EFFECTS ON STOCK MARKET VOLATILITY:



Transmission of credit market anomalies to stock market anomalies

Received: 06.01.2024 Accepted: 07.08.2025 Published:29.08.2025

As NPLs increase the collaterals lose value MBV. Volatility of equity increases drastically.

Stock market efficiency decreases accordingly because of mismatch in market to book value far beyond the prerequisites of investor sentiment and speculation in the stock market.

Therefore non-performing loans affect stock market volatility and efficiency and might herald explicitly the issue of super multiplier effect whereby volatility in stock markets translate after amplification into macroeconomic negative shocks as shown by the chart where pikes in NPLs correspond to periods of sharp recessions in the global economy after a short lag during which the transmission process of the super-multiplier occurs.

6.2 Effects of Information Asymmetries and Cost of Agency on Stock Prices Volatility

The effects of agency costs and information asymmetries such as free riding and moral hazard are transmitted to bank profitability through the credit risk channel.

The effects of leverage and the super-multiplier amplify uncertainty about risk rating and ultimately affect banking efficiency and private investment.

Credit scoring and the assessment of borrowers' creditworthiness are subject to asymmetries, which significantly affect credit production and hence bank profitability, since most asset profitability is derived from credit production.

The more agency costs and information asymmetries prevail, the more bank profitability is deteriorated through unrecovered credits.

Thus, there is a negative relationship between agency costs and information asymmetries and bank profitability.

In order to stop the circumvention of prudential measures of banking supervision, bank profitability should increase to dissuade bank management from resorting to malicious practices such as retargeting of bank customers and unfairness such as setting higher risk premiums for households than for firms in order to generate excess profit margins and to persuade shareholders to introduce more equity capital in order to favor the reduction of liquidity risk and to be able to generate excess profits by bearing a higher credit risk.

In order to increase ex-ante bank profitability, arrangement costs and information asymmetries would have to be reduced, and for this banks would have to rely less on the client histories provided by the scoring agencies and carry out more rigorous, albeit more costly, feasibility studies of projects.

Received: 06.01.2024 Accepted: 07.08.2025 Published:29.08.2025

This is in order to reduce the costs of arrangement by learning effect and to reduce the information asymmetries by the reliability of the evaluation of the solvency of borrowers a priori and thus to be able to increase the banking profitability and to attenuate the systemic risk and the financial instability and perhaps even to attenuate the negative macroeconomic shocks such as well stated by the phenomenon of the super-multiplier according to which shocks perceived by the volatility of equity prices and therefore automatically of the profitability of assets are transmitted to the macroeconomic arena in an amplified manner.

Indeed, one can simultaneously act on the cost of agency and information asymmetries such as free riding, although this is contradictory.

In fact, by lowering the agency cost, one would think that banks would save on the collection and analysis of data on the creditworthiness of borrowers and credit ratings.

But it is necessary to say that by allocating a team specialized in the study of the feasibility of the projects, with the passing of time they acquire by phenomenon of learning of the aptitudes to well detect the profitable projects of those whose financing risks to reveal a not covered credit.

In this way, both the cost of development and free riding are considerably reduced.

6.3-Importance of Effects Of Borrowers Credit Worthiness on Stock Market Stability

As borrowers' credit worthiness improves external borrowing becomes less expensive there is a demand pull from stakeholders because of the financial acceleration corporations are better off Dividends decrease and share prices increase contrariwise to volatility which is dampened because of the bargaining power that is reduced for stakeholders and more bargaining power for corporations management which makes stability improve and stock market more resilient to the onslaught of financial distress like a stock market crash.

Contrariwise when borrowers' Creditworthiness deteriorates stock market sector is less stable in terms of financial stability.

6.4-Implications on Stability and Prudentiality

Borrowers credit worthiness affects tremendously the cost of external borrowing for corporations that are priced at the stock exchange.

An improvement in borrowers credit worthiness affects the leverage effect or the financial accelerator effect.

An improvement in the net worth of corporations is generally associated with an improvement in Borrowers credit worthiness which relaxes the cost of external borrowing in such a way that

Received: 06.01.2024 Accepted: 07.08.2025 Published:29.08.2025

there exists a demand pull from corporations management with respect to equity thereby improving the bargaining power of the management with respect to stakeholders that react by decreasing fluctuations of the cost push on dividends.

The capital asset pricing model states that dividends are inversely proportional to share prices

This in turn makes fluctuations of share prices deteriorate.

Therefore, an improvement in borrowers credit worthiness deteriorates excess volatility of share prices thereby exacerbationg stock market sector financial stability through the bargaining power channel whereby a lack of dependency on equity decreases volatility of dividends and by a way of consequence increases volatility of share prices deteriorating thereby the market risk in the stock market sector.

7. HEDGING AND PRUDENTIALITY: AN APPRAISAL

7.1. The Importance of Hedging

In terms of integration must of portraying a prudential scheme and rendering interaction across financial sectors permissible, the stock market sector presents the specificity of encompassing a stock options feature that compromises the purview of the true scope of the key market risk fundamental which is volatility on which we based our fundamental justification of market risk and that does not hold in this instance.

According to Sajjad and Zamman: “Derivatives enable firms to hedge against systemic risks”.

As long as prudential surveillance is related to systemic risk mitigation, it follows that hedging does play a prudential role of hedging against systemic risks and financial instability as much as prudential instru-ments like the ones displayed in the framework of the engineering we proceeded to in this article.

Indeed, as long as stock options cancel any possibility of loss, excess volatility does no longer imply necessarily as a main cause for market risk and instability.

The basic framework set so far does no longer hold and requires further extensions concerning either the concepts of efficiency or stability which reveal a compromising further purview in terms of prudential surveillance instruments engineering.

It is considered that derivatives increase the efficiency of the financial system. By a way of consequence they deteriorate stability. Here surges a conundrum whereby from one side derivatives hedge from losses and by a way of consequence market risk and from the other side by

Received: 06.01.2024 Accepted: 07.08.2025 Published:29.08.2025

deteriorating stability they call the urge for further Prudential intervening. But as long as the most prominent role of prudential intervention is ensuring more stability. It is consented that prudential instruments are mainly purporting at mitigating the very source of market risk which is excess volatility.

But given the nature of hedging of derivatives, excess volatility does not necessarily compromise market risk for investors in the sense of presenting a source of loss.

So where does the threat from derivatives to stability really come from?

Corporate hedging affects directly Stock market stability through the risk management related issue affecting equity and henceforth valuation either book or market one and indirectly through its effect on the credit transmission mechanism of credit that by affecting monetary policy stance exerts an impact on overall financial stability and in special stock market stability.

According to Ingo Fender (2000), « Derivatives enable their users to separate value and transfer market risks. Risks are securitized and thus gain fungibility which in turn allows the unbundling and repackaging of market risks embodied in underlying assets. The use of derivatives therefore enhances the possibilities for active corporate risk management which is likely to have an impact on macroeconomic and monetary issues ».

The threat from derivatives to stock market stability comes from the financial accelerator. Indeed, by hedging interest rates, the wedge between internal and external financing for corporations vanishes. Therefore, equity becomes less necessary. Hence, stakeholders exert less power and become by a way of consequence less sensitive to projects outcomes. Therefore, dividends are less volatile and so are stock prices, what proves that derivatives are a main cause for stock market stability.

By ensuring more stability they compromise efficiency.

Therefore, there are two opponent views on the way derivatives affect stock market stability.

Information asymmetries and the skepticism about Modigliani's theory raises a concern about how far the credit channel of transmission of monetary policy does affects stock prices volatility.

7.2. The Prudential Role Played By Hedging

The issue of prudential surveillance is especially concerned by the use of derivatives.

As a matter of fact; on the one hand by improving efficiency and stability the use of hedging instruments alleviate burdens on the task of prudential surveillance by making it easier to promote financial stability and efficiency; but on the other hand by helping create crises and increasing

Received: 06.01.2024 Accepted: 07.08.2025 Published:29.08.2025

systemic risk in the case of speculation and speculative attacks on exchange positions the use of derivatives worsens the situation and urges the call for contagion targeting prudential instruments.

Hedging does play a macro prudential role by capping the riskiness of expected returns that are fundamental in increasing volatility of stock returns.

As a matter of fact volatility of stock returns is the core source of systemic risk in stock market as it is pro cyclical with its own industry average behavior of returns and the business cycle and determines the pattern of systemic exposure of the stock market because stock returns determine stock prices.

So by hedging we break the pattern of volatility and covariance between stock prices whenever hedging in itself is not systemic or does not hold for all similar stock securities.

Certainly hedging plays a macro prudential role but cannot be taken for a macro prudential instrument as it is not intended at mitigating financial vulnerability but at ensuring minimizing losses on returns.

As long as the objectives of hedging and prudential surveillance are different, they cannot be taken for holding as fulfilling the same task.

7.3 Hedging and Borrowers Credit Worthiness

Hedging is about a financial stategy of derivatives that derives from conventional financial instruments that uses financial instruments or market strategies to offset the risk of any adverse price movements.

Investors hedge one investment by making a trade in another.

In pure economic terms this introduces frictions that display merits in terms of expectations and probabilities of earnings for investors as it works as a warranty for shielding from losses.

But these frictions will essentially lead through contagion to a bad quality of assets whereby corporations hedging for the outcome of acquisitions and transactions that are quoted in the stock market are likely not to care about a criterion that affects tremendously the cost of borrowing which is the analogous source of financing for equity.

Henceforth this will introduce of bias of selection and exacerbate the financial stability of the credit market.

Indeed as long as the corporation assets are hedged against future losses i twill matter least for the corporation management if the cost of external borrowing is minimized. This will affect negatively borrowers' credit worthiness as the corporation management will no longer care about

Received: 06.01.2024 Accepted: 07.08.2025 Published:29.08.2025

the way the financial intermediary which is the bank will shed the light on their probability of default or what could be called their borrowers 'credit worthiness this will introduce an information asymmetry which is adverse selection and will lead the corporation to have a misconduct about expansion projects appraisal and risk of default which will exacerbate financial stability from the credit sector side.

The pervasiveness of information draws a wedge between stock market valuation and assets quality.

Usually stock that performs well is backed by a good quality assets which informs on a sound management of the corporation from which the asset derives from

This means that stock that performs well enough and that does not need hedging is that which corresponds to a sound management and therefore a fairly good borrowers credit worthiness.

The rule of thumb is that if the corporation does not default with the bank it is more likely to make its shares stand for a good asset and therefore perform well and not require hedging to ensure a benefit for investors.

So in definitive although hedging exerts a positive effect on Stock market financial stability it does exert a negative effect on credit market financial stability.

There is a skepticism about its overall effect as it is tough to weigh the effect of warranting expected future losses in the stock market with the effect of a deterioration in borrowers' credit worthiness and the probability of default on loans which is very harmful in terms of financial stability.

7.4 Hedging and the Balanced Score Card

Hedging is about a financial strategy of derivatives that derives from conventional financial instruments that uses financial instruments or market strategies to offset the risk of any adverse price movements.

Investors hedge one investment by making a trade in another.

In pure economic terms, this introduces frictions that display merits in terms of expectations and probabilities of earnings for investors as it works as a warranty for shielding from losses.

But these frictions will essentially lead through contagion to a bad quality of assets whereby corporations hedging for the outcome of acquisitions and transactions that are quoted in the stock market are likely not to care about a criterion that affects tremendously the cost of borrowing which is the analogous source of financing for equity.

Received: 06.01.2024 Accepted: 07.08.2025 Published:29.08.2025

At this stage it is noteworthy that by making recourse to hedging we neglect the balanced scorecard suggestions about risk management as earnings are guaranteed disrespectfully of the assessment of risk and the organizational hindrances to performance improvements that might exacerbate borrowers' credit worthiness and the probability of non-performing loans.

Henceforth this will introduce of bias of selection and exacerbate the financial stability of the credit market.

Indeed as long as the corporation assets are hedged against future losses it will matter least for the corporation management if the cost of external borrowing is minimized. This will affect negatively borrowers' credit worthiness as the corporation management will no longer care about the way the financial intermediary which is the bank will shed the light on their probability of default or what could be called their borrowers 'credit worthiness. Besides they will neglect the balanced scorecard supervision advices about risk management and organizational implications on performance.

This will introduce an information asymmetry which is adverse selection and will lead the corporation to have a misconduct about expansion projects appraisal and risk of default which will exacerbate financial stability from the credit sector side.

The pervasiveness of information draws a wedge between stock market valuation and assets quality.

Usually stock that performs well is backed by a good quality assets which informs on a sound management of the corporation from which the asset derives from

This means that stock that performs well enough and that does not need hedging is that which corresponds to a sound management and therefore a fairly good borrowers' credit worthiness.

The rule of thumb is that if the corporation does not default with the bank it is more likely to make its shares stand for a good asset and therefore perform well and not require hedging to ensure a benefit for investors.

So in definitive although hedging exerts a positive effect on Stock market financial stability it does exert a negative effect on credit market financial stability.

There is skepticism about its overall effect as it is tough to weigh the effect of warranting expected future losses in the stock market with the effect of a deterioration in borrowers' credit worthiness and the probability of default on loans which is very harmful in terms of financial stability.

Received: 06.01.2024 Accepted: 07.08.2025 Published:29.08.2025

8. CONCLUSION

The fundamental added value of this research is about setting a new structure of formulation of Risk and the resulting distribution of risk that reveals complying to finance theoretical predilections of a polynomial structure.

Alongside key drawbacks of the currently adopted prudential fra;ework and the alternative solutions to annihilate its drawbacks the risk formulation dras the wedge of conventional framing of risk and one key issue which is early warning deployed either through sensitivity forecasting models with long run co-integration or jump effects models like the regime switching models.

There is an outstanding pervasiveness of prudential instruments displaying the major drawbacks of interconnectedness, complexity and opacity along with the inability of back-testing and other drawbacks such as inaccurate estimation ability of the risk charge figures Delta, Vega and the incremental risk for market risk pertaining to the credit sector as displayed in Basel IV and that should be dealt with accurately.

Financial vulnerability is more complex to mitigate in the framework related to the stock market because of the prevalence of excess volatility of stock as a key threat to Stock market stability and require engineering of the adequate instruments aiming at mitigating excess volatility of share prices.

Main features characterizing the credit market such as the prevalence of information asymmetries the relevance of taking into account borrowers' credit worthiness which are the corporations securitized in the stock exchange and the importance of Non-performing loans should be accounted for with deep concern whenever the financial accelerator effect and the super-multiplier effect are framed in perspective with the requirement of mitigating financial instability heralding in the stock market.

The conventional prudential surveillance frameworks are displaying a shortsightedness and are valid exclusively for the short run disrespectfully of the requirement of proceeding to early warning and long run forecasting for the sake of annihilating the likelihood of unexpected outbursts of financial distress.

This is mainly due to the fact that the features that render financial crises and bank runs very harmful is the fact that they hit unexpectedly without allowing for a time span for the regulator to

Received: 06.01.2024 *Accepted: 07.08.2025* *Published:29.08.2025*

react in a curative manner and should therefore be maneuvered in advance following a certain scrutinizing of risk dispersion and moments which are the skew and Kurtosis.

Therefore the adopted preventive approaches that help upgrade the short run prudential frameworks and the early warning approach are the best fit for mitigating the likelihood of outburst of financial meltdowns.

REFERENCES

Frei Cristoph (2017), Modeling credit risk and loan portfolio in the presence of autocorrelation UBS University of Alberta

Yue Yu and Pavel Loskot (2022), Polynomial distributions and transformations ZJU-UIUC Institute Haining China

Yuhong Sheng and Kai Yoo (2014), Some formulas of variance of uncertain random variables, Journal of uncertainty analysis and applications

Adrian T and Rosenberg J (2008), Stock returns and volatility: pricing the short run and long run components of market risk, The journal of Finance V 63

Agrawal Shreya, Sangeetha R, (2019), The impact of macroeconomic determinants on the performance of the Indian Stock Market, International Journal of Business and Management invention, Volume 8 Issue 3 Series V pp 16-23

Stiglitz E. Joseph (1982) The inefficiency of the Stock Market Equili-brium, Review of Economic Studies (1982) XLIX, pp 241-261 Princeton University

Alla Chalova, Elena Gromova and Elena Voronkova (2019), Integration of the financial market sectors: Factors, Risks and management approach, International journal of mechanical engineering and technology pp 1243-1250

Ray Ball (2000) What do we know about stock market efficiency? Ma-nagerial economics research letters at the university of Rochester USA

Tak Kuen Siu (2010) A Markov regime-switching marked point process for short rate analysis with credit risk Department of actuarial studies, Faculty of business and economics, Macquire University Sydney NSW 2190 australia International journal of Stockastic analysis Volume 2010 Article ID 870516

Kim Tae Yun, Do Kyong and Son suh (2009) Stock market stability index: An intelligent approach,

Received: 06.01.2024 *Accepted: 07.08.2025* *Published:29.08.2025*

Intelligent data analysis, DOI 10-3235 pp 983-993

Sajjad F, Noreen V and Zaman K (2013), Imapct of derivatives on financial services sector and risk management, Middle east journal of scientific research ISSN 1990-9233

Rolf J Daxhammer and Jonathan Kappler (2016), The examination of a profitabilitybased four factor model to explain stock returns: Empirical evidence from the German Stock market, ESB Business School Reutlinger University

Goerge Akerlof (1970), the market of lemons, the quarterly journal of economics vol 84 pp 488-500

Stiglitz J and Weiss A (1981) Credit rationing in markets with imperfect information, The american economic review V 71 pp 393-410

Dell'Aricca G (2001) Asymmetric information and the structure of the banking industry, European economic review, V 45 pp 1957-1980

Lynn Aylward and Rupert Thorne (1998) Countries' repayment performance vis-à-vis the IMF, IMF staff papers a quarterly journal of the IMF V 45

Mishkin FS (1998) The economics of money Banking and financial markets, Editor : Addison Wesley Boston

Dell'Arricia (1998) Assymetric information and the structure of the banking industry, IMF working paper International Monetary Fund WP/98/92

Agrawal Shreya, Sangeetha R, March (2019), The impact of macroeconomic determi-nants on the performance of the Indian Stock Market, International Journal of Business and Management invention, Volume 8 Issue 3 Series V pp 16-23

Baker M and Wungler J (2006), Investor sentiment and the cross-section of stock re-turns, The journal of finance volume 6 Issue 4 Pages 1645 to 1680

Ball Ray What do we know about stock market efficiency ? Managerial economics re-search center at the university of Rockester and the John M Olin foundation

Dimson Elroy, Mussavian Massoud, March (1998), A brief history of market efficiency, European financial management, Vol 4, N 01 pp 91-193

Fei Wu, Dayong Zhang and Zhiwei Zhang (2018) Systemic risks and spillovers in the stock market of China : a sectoral analysis, Research institute of economics and management Southern universtity of finance and economics China.

Fortin Michel, Khoury Nabil T (1988), Effectiveness of hedging interest rates risks and stock

Received: 06.01.2024 Accepted: 07.08.2025 Published:29.08.2025

market risks with financial fultures, The journal of futures markets Vol 8 N 3 pp 319-334

Gurcharan Singh and Salony Kansal (2010), Impact of derivatives trading on stock market volatility during pre and post Fand O period : A case study of NSE, School of management studies Punjabi university Patiala Volue 1 No 1

Joseph Stiglitz (1982), the inefficiency of the stock market equilibrium, Review of economic studies XLIX, pp 241-261

Malcolm Baker and Jeffery Wurgler (2007), Investor sentiment in the stock market, Journal of economic perspectives, Volume 21, Number 2 pages 129-151.

Peter Haiss and Bernhard Sammer (2010), The impact of derivatives markets on financial integratuion risk and economic growth, Institute of international business Vienna University of economics and business presented at the Athenian policy fo-rum 10th biennial conference on regulatory responses to the financial crisis Frankfurt 28-31 july 2010

Roberto Casarin and Carmine Trecroci (2007), Business cycle and stock market vola-tilities are they related?, CEREMADE and department of economics Paris Dauphine Septemner 2007

Sahel Benjamin, Vesala Jukka (1999), Financial stability analysis using aggregated data, European Central Bank BIS papar N 01

Stiglitz E. Joseph (1982) The inefficiency of the Stock Market Equilibrium, Review of Economic Studies (1982) XLIX, pp 241-261 Princeton University

Genc (2012) Empirical estimation of elasticities and their use, Department of Economics University of Otago New Zealand

Banks J, R Bundell and A Lewbel (1997) Quadratic engel curves and consumer demand, Review of Economics and Statistics 79, 527-539

Board of Governers of the Federal Reserve System (2023) The FEDERAL RESERVE BANK

Abdali Seja (2013), Toward a conceptual framework for integrating enterprises performance and risk management, Journal of Management research ISSN 1941-899x 2013 vol1 N 04

Beasley, Chen Nunez and Wright (2006), Working hand in hand : Balanced scorecard and enterprise rsk management Annual conference topic: Strategic finance and Risk management

Gordon, Loeba and Tseng (2009), Enterprise risk management and firm performance : a contingency perspective, Journal of accounting and public policy Elsevier vol 28 p 301-327

Sahajwala and Bergh (2000), Supervisory risk assessment and early warning systems, Basel committee on banking supervision working papers

Received: 06.01.2024 *Accepted: 07.08.2025* *Published:29.08.2025*

DISCLOSURE OF CONFLICT

The author(s) declare that they have no conflicts of interest.