Impact of Financial Development, Institutional Quality and Population Characteristics on Sustainable Development: The Moderating Role of Regional Integration

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Abstract

The basic purpose of our study to empirically investigate the three independent variables i.e., financial development (FD), institutional quality (IQ) and population characteristics (APL) on sustainable development proxied by adjusted net savings as dependent variable. Furthermore, the moderating effect of regional integration along with controlling variable inflation, current account balance, exchange rate and unemployment are explored in One Belt and One Road (OBOR) countries. The effect and interactions of a large set of variables on sustainable with the moderating effect of regional integration. Which determine what policies, need to spur the sustainable development in a most emerging and economic region of countries. This study utilizes panel data from the longest data set over the period 2005-2020 for 64 One Belt and One Road (OBOR) countries. Empirical research regarding macroeconomics, finance, regional and international fields to back policy decisions.

Study used the two-step Sys-dynamic GMM's final model that findings show that financial development (FD) and institutional quality (IQ-WDI) is significant and positive value at 1% significance level which will increase level of sustainable development. The third and last independent variable earning population (APL) coefficient is negative but significant at 5% significance level. The independent variable, FD and Institutional Quality (IQ-ICRG) is positive and significantly impacts on sustainable development significance level. While APL negatively influences the sustainable development at 5% significance level.

Additionally, the model is further extended with interaction term of FD and RII. The results of interaction term FD*RII shows the positive coefficient value but not significant. Moreover, the interaction term IQ-WDI*RII shows the positive coefficient value at 5% significance level. The interaction term APL*RII shows the negative coefficient value but not significant.

Sustainable development is continuously gaining a huge attention from policy maker, academics, and industry representatives. Also, the sustainable development coupled with economic, social, and ecological fields to acquire the societal, technological, institutional, and political requirements of the world.

Keywords: *Sustainable Development (SD), Financial Development (FD), Institutional Quality (IQ), Earning Population (APL), Inflation (INFL), Exchange rate (EXR), Unemployment (UNP), Current account balance, Regional Integration Index (RII)*

Contents

LIST OF ACRONYMS

SD	Sustainable Development
FD	Financial Development
APL	The Average Share of the Population of Ages
IQ	Institutional Quality
GI	Globalization Index
RII	Regional Integration Index
INFL	Inflation (INFL)
CD	Current account deficit (E. A. Mason & McDaniel)
EXR	Exchange rate (EXR)
UNP	Unemployment
CAB	Current account balance
ANS	Adjusted Net Saving Rate
NNS	Net national savings
GNI	Gross national saving
VA	Voice of Accountability
GE	Government Effectiveness
POLS	Political stability
RQ	Regulatory quality
CC	Corruption
RL	Rule of Law
EG	Economics Growth

CHAPTER NO 1

INTRODUCTION

1.1 Overview

Nowadays, sustainable development gaining considerable raising attention from academicians, economist, and political decision-makers (Koirala & Pradhan, 2020). Also, the sustainable development coupled with economic, social, and ecological fields to acquire the societal, technological, institutional, and political requirements of the world. Moreover, Adshead et al. (2019) reported that being a combination of societal and environmental awareness the SD is becoming increasingly important. Being a holistic notion and global goal that sustainable development must be achieved by all economies. Particularly achieving sustainable development in the One Belt and Road emerging economies is major concern for policy maker because of emerging issues such as poverty, economic and financial crises, education, population, climate change, terrorism, unemployment.

Policymakers and academicians have been interested in determining if the country's economic growth, financial development, and environmental measurement contributes to the country's sustainable development over the last twenty years. Policy makers and academicians mainly cited the sustainable development in the development of recent literature. The Sustainable development refers to meeting the requests of the current people without jeopardizing the upcoming generation's capability to fulfill their requirements (WCED, 1987). Furthermore, sustainability is defined as the ability to offer well-being to future generations, as measured by an inclusive wealth index that incorporates the marketed and non-marketed assets (Din et al., 2022).

Sustainable development is a concept that combines social, environmental, and economic development. It is centered on the assumption that economic progress has touched all people, which reduces poverty by financial development in society, which eventually leads to keeping good ecological and natural standards. In the development process, it is vital to integrate and reconcile environmental, social, and economic dimensions into a wide-ranging and stable sustainable development. The intention of national development is to decrease poverty as much as possible through expanding financial availability and promoting long-term development. The positive impact of sustainability on social considerations can be attain if the growth is distributed evenly across the populace that can be achieved by reducing the income-gap among the wealthy and the rest of the populace(Ullah, Pinglu, Ullah, Abbas, et al., 2021). Due to inadequate fiscal management, political instability, and corruption, sustainable development must incorporate a long-term plan to increase the country's prosperity (Kihombo et al., 2021).

The financial sector's relevance to the dynamic economic development of a state is to build trustworthy financial systems that accelerate technological advancement through resource mobilization, such as increasing investments, savings, and boosting foreign capital inflow (FCI) to encourage sustainable development. An effective financial system or financial system is a critical tool that fuels any economy's development worldwide. So, the financial development and advancement considered as critical means for achieving sustainable economic and financial systems. The country's continuous economic growth recognized that economic and financial development are essential ingredients as they boost living standard of the public and private sectors. Thus, future financial progress will be unsustainable if the world fails to address climate change and global warming issues through expanding investment in green energy and the economy (Ahmed & Le, 2021; Koirala & Pradhan, 2020). Financial

development primarily refers to the provision of liquidity in the capital market, which boosts economic productivity and, as a result, boosts a country's economic growth.

In today's globalized environment, institutional quality and sustainable development are inextricably intertwined. Good governance procedures allow international and national investors to freely make decisions regarding investments, resulting in sustainable development (Zhu et al., 2019). Furthermore, if a country's technology adoption situation improves, government concentrated on sustainable development and is viewed as a governance by technology that should advance the administrative tasks and restructure the network of interactivity amongst governments and their constituents, governments and citizens, and businesses and employees (Ullah, Pinglu, Ullah, Abbas, et al., 2021). Fayissa and Nsiah (2013) sated that good governance has become requirement of growth expansions to supports developing countries. The empirical literature emphases on several institutional indicators. A study T. Dietz et al. (2007) found that corruption has a detrimental impact on sustainable development in resource-rich nations, while (De Haas & Vezzoli, 2011) also found a comparable effect in African and Asian countries. A study conducted by Stoever (2012) found that intuitional quality positively contributed to sustainable development but ignored bureaucracy role. Another study, Haseeb and Azam (2021) find the importance of institutions on sustainable development in developing nations. None of these studies describe how the institutional quality influence is spread to sustainable development. Therefore, it is important to explore the nexus of institutional quality and sustainable development.

Earning Population share refers to the population age groups which defined as follows: children and adolescents under the age of 15 who are reliant on their parents or other family members make up the first category. The working-age population being the second category which ranges from 16 to 64 years old considered as an essential determinant to contribute to the country’s sustainable development. People in the third group, who are 65 years or older and

rely on their savings. The nexus between earning population shares and sustainability has been examined by Dietz (2007) who reported that population characteristics share between 16 to 64 significantly and positively contributed to the sustainable development. Recently, found that there is negative impact of youth dependency ratio on total factor productivity (TFP) which is harmful for economic growth. Bloom et al. (2003) claimed that a dropping youth dependence ratio (the population under the age of working age divided on the population of working age) boosts East Asia's economic miracle similarly (A. Mason, 2003). Recently studies observed that lowering youth dependency ratios leads the economic growth in developing economies. David E Bloom et al. (2001), Bloom and Williamson (1998) and Crenshaw et al. (1997) used cross-country data with regressions model on under develop and developed economies and found that declining youth dependency ratios positively and significantly impacted the economic progress. In OECD economies, Lindh and Malmberg (1999b) and Malmberg (1994) found significant population characteristics impacts the savings, inflations, and economic development.

Sustainable Development primary concentrated to make a state more economically efficient, socially beneficial, and environmentally welcoming. Regional integration and regional integration are expanding and can help the region achieve long-term development by acting as a facilitator for trade advancement and socioeconomic expansion, especially in emerging markets. According to Brautigam and Tang (2014), the millennial century is China's century since it demonstrated to the rest of the globe the country's ability to achieve extraordinary growth. So, China has resolved the sustainable development's issue throughout Eurasia via belt and road initiative proposal as a key to achieving common goals. China acknowledged the belt and road initiative framework as the belt and road initiative's system supporter, based on the substance of the original Silk Road. Therefore, it is an effort to hasten market integration in Eurasia, which will transform the trade channel amid the Mediterranean

Sea and China, which was formerly driven by well-organized trade on the Chinese Silk Road in around 114 BCE. The Economic Belt Silk Road and 21st Century Maritime Silk Road are land-based roads, and primarily described as China's new Silk Road type.

Belt and Road Initiative (BRI) is expanding and has the potential to encourage the sustainable development notably in terms of trade advancement, expanding markets, and socioeconomic development. Many countries have signed cooperation treaties since the Belt and Road Initiative BRI was introduced in 2013 (Zhao et al., 2019). The share of 57 BRI nations in global GDP was 38.8 percent in 2016 which was raised from 30.4 percent in 1991(Benintendi et al., 2020; Muhammad et al., 2020; Saud et al., 2020). This initiative represents a fair deal and attracts the real investment in-country.

The growing integrated regional economies provide regional action, robust financial markets, value chains, trade advancement, and raise socio-economic in the regions by making them more integrated. China has specifically addressed Eurasia's sustainable economic development by Belt and Road Initiative (BRI), which considered as a crucial to attaining reciprocated goals while promoting sustainable development. The belt and road initiative intended to serve beyond the border by trade flow non-governmental exchange, financing, policy communication, enabling regional connectivity. It encourages all countries to grow in terms of infrastructure, technology, and sustainable development (Tambo et al., 2019; Ullah, Pinglu, Ullah, Abbas, et al., 2021; Zhou et al., 2020).

This study wants to analyze the impact of financial development, institutional quality, and earning population on sustainable development. Because sustainable development is continuously gaining a huge attention from policy maker, academics, and industry representatives (Serenis & Tsounis, 2014; Un, 2016). One of the largest infrastructure and economic development initiatives in modern history, the Belt and Road Initiative (BRI) seeks to improve connectivity and collaboration between China and nations in Asia, Europe, and

Africa. Evaluating the influence of several factors on sustainable development in these nations is essential to comprehending the overall effectiveness and consequences of the Belt and Road Initiative. A country's financial development can have a big impact on its attempts to reduce poverty, promote environmental sustainability, and grow economically. For the purpose of creating successful policies and strategies, it is crucial to comprehend how financial development interacts with the sustainable development goals (SDGs) inside the BRI countries. Impacts on the economy, society, and environment are mostly determined by institutions. Greater governance, increased investment, and more sustainable development are typically found in nations with stronger institutions. Determining how institutional quality affects sustainable development results in the framework of the Belt and Road Initiative (BRI) sheds light on how crucial governance frameworks are to reaching development objectives.

The population size, age structure, and earning population of a nation can all have a significant impact on its course for development. It is crucial to comprehend how these population characteristics interact with BRI countries' sustainable development goals in order to customize policies to address particular possibilities and problems related to demographics. Examining how regional integration influences the relationship between population characteristics, institutional quality, financial development, and sustainable development outcomes, all of which are related to one other and offers important insights into the larger dynamics influencing the success of the BRI. Policymakers, international organizations, and other BRI stakeholders can learn more about the main factors influencing sustainable development in the participating nations from the study's conclusions. Within the BRI framework, policymakers can create more effective policies to promote ecologically sustainable and equitable development by identifying areas where interventions can have the most impact.

Thus, in order to comprehend the difficulties of development within this major geopolitical undertaking, this study is both highly relevant and required. This study investigates the dynamic impact of financial development, institutional quality and earning population on sustainable development, with the moderating effect of regional integration along with controlling variable inflation, current account balance, exchange rate and unemployment on One Belt and One Road countries, from the period of 2005 to 2020. The study used the most recent empirical two-step system GMM technique and ensure accuracy through alternate variables.

1.2 Research questions

Followings are the research questions of this study:

1. What is the effect of financial development on sustainable development?
2. What is the role of institutional quality on sustainable development?
3. What is the effect of population characteristics on sustainable development?
4. What is the moderating role of regional integration on the nexus between financial development, Institutional quality and earning population characteristics on sustainable development?

1.3 Research Objectives

Objectives of the study are:

1. To examine the impact of financial developments on sustainable development.
2. To examine the impact of institutional quality on sustainable development.
3. To examine the impact of population characteristics on sustainable development

4. To investigate how regional integration influences the strength and direction of the impacts that financial development, institutional quality, and population characteristics have on sustainable development.

5. To determine what policies, need to spur the sustainable development in a most emerging and economic region of countries.

1.4 Significance and Contribution of the study

The present study will empirically investigates the impact of financial development, institutional quality and earning population on sustainable development by controlling the effect of inflation, current account balance, real exchange rate and unemployment with the moderating effect of regional integration on the most emerging and developing countries "One Belt and One Road" (OBOR) on the longest available data set from the period of 2005-2020 by applying the most robust econometric estimation technique GMM for panel data. In addition, upon the above premises, the big question in literature seeks the answer, how institution quality enhances the development by considering environment and natural resources.

This research will make valuable contributions to a previously unexplored range of factors, such as adjusted net savings, which includes the emission damage index of the World Bank for sustainable development, financial development, institutional quality, and age structure. Additionally, it will give significant attention to other socio-economic variables, namely inflation, current account balance, exchange rate, and unemployment, as control variables that concerning the moderating role of the regional integration of Belt and Road countries.

This research will help countries in policy formation for digitalized development along with environmental quality in presence of good governance. As per my best, this study is unique both theoretically and empirically. First, it fills the literature gap by performing analysis

on longest available data set of the most important region of world (OBOR) in terms of GDP, development, infrastructure, and economic corridor. Secondly, in literature the interaction of institutional quality and earning population is least tested with sustainable development with the moderation role of regional integration. It will contribute to literature by investigating the interaction with recent and emerging indicators on large data set of countries.

Third, previous studies have employed various approaches to enhance institutional quality, encompassing aspects such as the voice and accountability, the rule of law, (Jadhav, 2012) quality governance (Ferreira et al., 2008) corruption and the political stability (Javorcik & Wei, 2009). This study will use all the six proxies of governance established by WGI to see their impact on economic indicators and sustainable development. Fourth, this study will perform series of econometric test; CIPS & CADF panel root test for panel cointegration modeling and variables incorporations, OLS, fixed effect model, GMM model to produce robust, consistent, and reliable results. All this way study add value in existing research and help practically development banks like Asian development to design policy at regional level.

By comprehending the ways in which financial development, institutional quality, population characteristics, and regional integration impact sustainable development, policymakers may make well-informed decisions. This makes it possible to create customized policies that address particular issues and take advantage of chances for successful sustainable development. Based on the study's findings, BRI nations can best use their resources, focusing on initiatives that have the most potential to improve the results of sustainable development, such bolstering institutions or supporting eco-friendly infrastructure. The study's findings can help BRI nations and other stakeholders cooperate internationally. Countries can work together more successfully to address shared difficulties and accomplish sustainable development goals if they have common aims.

Gaining insight into the elements that contribute to sustainable development might increase the attraction of BRI nations to foreign investors who meet their environmental, social, and governance standards. Prosperity and long-term economic expansion may result from this. The findings assist BRI nations in identifying and reducing development initiative risks, including as social inequality and environmental deterioration. It is possible to take proactive steps to alleviate issues, which will lessen the impact on sustainable development initiatives. The study helps BRI countries establish policies and projects that support inclusive growth and ensure equal distribution of benefits across society by concentrating on the interactions between diverse elements. All things considered, the study provides insightful analysis and useful recommendations to help BRI nations accomplish their objectives for sustainable development, promote economic expansion, and improve the welfare of their people.

1.5 Dissertation Outline

This **first** chapter based on the background motivation of the study, research problem which further leads towards the research key objectives and questions. Also, first chapter focus on the significance and contribution of the research. Remaining, **second** chapter focus on the key concept's definitions, theory and build the relationship between the independent, dependent and moderating variables based on the research gap and hypothetical theory. Furthermore, this chapter based on the conceptual framework of the studies. **Third,** chapter focus on the research methodology. **Fourth,** chapter focus on results and discussion and **fifth,** chapter focus on conclusion, recommendations and future of this study.

CHAPTER NO 2

LITERATURE REVIEW

2.1 The Concept of Sustainable Development

The United Nations (UN) and its member states permitted the 17 Sustainable Development Goals (SDGs) with 169 targets of 2030 Agenda in September 2015 for sustainable development like the preceding Millennium Development Goals (MDGs). The agenda determines the international assurance to attain sustainable development globally in its social, environmental, and economic areas (Bexell & Jönsson, 2017). To attain these goals, the United Nations General Assembly designated the decade 2030 as the "Decade of Action and Delivery," requiring all players, the corporate sector, governments, policymakers, and society at large to come together and work toward the SDGs' accomplishment (Carlsen & Bruggemann, 2022).

Every country of the world is concerning about the Sustainable development which is describes as an advancement that accomplishes the present standards without challenging the upcoming generation’s room to meet their needs. In addition, this notion confirms the human welfare through guarding material acquirement, natural resources, and growing wealth & revenue. Sustainable development refers to providing a quality life with fulfilling the necessities of current generation without compromising the ability of forthcoming generations (Missimer et al., 2017).

Sustainable development consists of its three dimensions namely: environmental, social, and economic to achieve the world’s institutional, technological, political, and social requirements. As per the development theory, these three components are necessarily to be

combined because overall doings are intended to be ensuring a balance amongst environmental, societal, and economic aspects of sustainable development.

The SDGs will only be achieved if financial resources are mobilized, and advanced technology are transferred to underdeveloped countries. To make this possible, the government must play a vital role, which requires both the creation of rules and regulations as well as financial assistance. On the other hand, government support is insufficient in underdeveloped or developing countries (Khemani & Kumar, 2022). Thus, business and society should make a significant contribution to accomplishing common goals of public interest in addition to the government, which functions as the central body for national governance, (Abhayawansa & Adams, 2021). According to Abhayawansa and Adams (2021), simultaneously national and societal values are created by achieving SDGs through a globalized approach, which is considered as an option to achieve the "sweet spot" represents the ideal intersection where value creation and global sustainable development are accomplished.

This study determines the relationship among financial development, governance, earning population and sustainable development by moderating the effect of regional integration by controlling the effect of inflation, current account balance, exchange rate and unemployment. Following relevant studies are conducted by (Kaimuri & Kosimbei, 2017; Khemani & Kumar, 2022; Muhammad et al., 2020).

In this study, sustainable development indicator was the adjusted net saving. As per the World Bank, "adjusted net saving" is the total national savings after taking into account annual variation in the stock of all types of capital (World Bank, 2016). Being a comprehensive indicator of sustainable development adjusted net saving has gained widespread acceptance (Arrow et al., 2013; Greasley et al., 2014). Gross saving, which is equal to the total income minus total consumption, is used to calculate adjusted net saving. Savings must balance depreciation of current assets in order to sustain wealth. The net saving captured this concept

which equals gross saving minus created capital's depreciation. Lastly, to get adjusted net saving includes the depletion of energy stocks, air pollution's negative effect, dwindling mineral assets, depreciation of natural capital. As per the World Bank (2007) to provide a concise overview of adjusted net savings (ANS), the following summary is obtained: Consumption of fixed capital minus from gross national saving results in national net saving. Hence, national net savings adds the education expenditure and minus all depletions and damages (such as mineral depletion, net Forest depletion, energy depletion, damage from particulate emissions and damage from carbon dioxide emission respectively) equals the Adjusted net saving.

The concept of ANS states that if annual savings are sufficient to counteract the depreciation of both generated and natural capital, then the economy can maintain its current level of wealth and consumption. And more comprehensive definition includes other endowments namely skills, knowledge, experience, and other social assets. Though, because the inadequate data and measurement obstacles the adjusted net saving's estimate is limited to created and natural capital. ANS by evaluating the change in comprehensive wealth provides a measure of sustainability. So, in order to transfer the present generation's request to coming generations, adjusted net saving assesses how well gains in natural and created capital are countered by net saving. ANS, on the other hand, evaluates the value change of a group of assets while eliminating capital gains. According to economic theory, the net present value of social welfare will rise when net saving is positive which implying that benefits of present value will outweigh the costs of present value.

On the other hand, a constantly detrimental ANS demonstrates the unsustainable path of an economy. In contrast, ANS cannot be negative which is a fundamental requirement for long-term sustainability. Over a consecutive period of years, a country's diminishing ANS

display the unsustainable path that diminishing the productive basis on which future generations' well-being rests.

ANS trends vary dramatically by location and country by the casual observation of the data. ANS like any other statistic has significant limits primarily because of measurement challenges and data scarcity. As previously stated, the ANS estimate is restricted the inclusion of natural and created capital, as well as a limiting human capital definition. This estimation did not include the social assets, knowledge, and other endowments. Furthermore, existing public education's expenditures do not always equate to a comparable return in human capital. In addition, private school expenses should be included in the calculation of ANS. The cost of pollution and the degradation of natural resources are also inadequate for accounting. Estimations of the value of fossil water isolated from aquifers, net depletion of fish stocks, and degradation of soil excluded from resource side. Estimation of mineral and energy depletion is dependent on upcoming volume, costs, and prices which may or may not be realistic.

The results of the social, environmental, and overall scales were shown to significantly differ between the sexes, with female individuals receiving higher ratings than male ones. Environmental sustainability was shown to have a considerably higher score among participants over the age of twenty. The environmental sustainability scores of the students were shown to significantly differ from one another based on the current state of thinking that there is a connection between sustainable development and nursing (Şimşek & Erkin, 2022).

The ability of all nations to achieve sustainable development is threatened by the fact that billions of people face the harsh reality of live-in poverty, there are growing wealth and power disparities within and between nations, gender inequality, unemployment, threats to the world's health, natural disasters, climate change, conflicts, terrorism, humanitarian crises, forced eviction of people, etc., (Djikanovic, 2022). The method by which today's requirements can

be satisfied without jeopardizing the ability of future generations to satisfy their own wants is known as sustainable development (WCED, 1987).

An expanding body of literature contends that setting global objectives like the SDGs may assist international organizations focus their efforts on more sustainable development. Global goals are time-bound, measurable, and aspirational policy objectives that have been internationally agreed upon but are not legally binding. International organizations, which are frequently split up based on geographical regions or issue areas, can use these objectives as focus points. International regulations, which are typically viewed as being more exact and enforced, are sometimes contrasted with global goals. Global goals are typically anticipated to have a considerable impact on governance at all levels of social organization, despite the fact that they are not legally enforceable. In other words, through minimizing fragmentation among them, global aims may also bind together multinational organizations. The degree to which international organizations adopt global goals as steering mechanisms above their own purposes will therefore be a key factor in determining the efficacy of these goals. International organizations would have to adopt the SDGs as widely recognized global objectives, agree to be governed by the SDGs' guiding principles, and change their behavior (Bogers et al., 2022).

International organizations may link one of the three pillars of sustainable development the environment, society, and economy to each of the SDGs. Although not explicitly stated in the objective framework itself, the distinction between these three aspects of sustainable development is frequently established in practice (Breuer et al., 2019). The relationship between the food, energy, and water sectors referred to as the "food energy nexus" has drawn a lot of attention. It seeks to investigate holistic responses to resource shortages while avoiding the drawbacks of silo thinking. Three of the seventeen Sustainable Development Goals (SDGs) of the United Nations, SDG2 (No Hungry), SDG6 (Clean Water and Sanitation), and SDG7 (Affordable and Clean Energy), are represented by the acronym FEW. These SDGs are

intended to be achieved by the year 2030 in order to create a better future for people. According to several research, the nexus method could help accomplish the SDGs by strengthening positive synergies, resolving negative trade-offs, and taking other cascading processes into consideration. Quantifying the real contribution of the nexus approach to the implementation of the SDGs is still lacking. The FEW nexuses have advanced in previous studies, primarily from two angles.

On one side, work has been done to optimize resource distribution. For instance, improved irrigation efficiency may result in increased energy use and hence higher water expenditures. Water use in other industries is impacted because thermal electric energy production needs a lot of water for cooling. On the other side, the degree of coupling coordination or other composite indices has been used to study sustainability within the FEW nexuses; the better these indices are, the closer to sustainability the system is. However, these findings do not offer any new recommendations for fostering synergy; rather, they just indicate the intensity of linkages among the FEW sectors (Junze Zhang et al., 2022). The findings indicated that SDG2 in China responded unfavorably to an unanticipated increase in SDG15 over a considerable amount of time, but SDG15 continuously shown a favorable response to shocks on SDG2. According to this conclusion, putting food security first will promote forest conservation even though SDG15's conservation and restoration of forests may hinder food production's (SDG2) ability to be produced. In fact, China's citizens are rewarded financially through a variety of forest protection and restoration initiatives.

The local people contended that certain schemes, including the Natural Forest Conservation program and the Grain for Green Project, nonetheless negatively impacted their way of life because the compensations provided did not equal the loss incurred by giving up their agricultural output and grazing activities (Cao et al., 2019). The motivation of local people to protect and hasten forest restoration can be increased by prioritizing the improvement of

livelihoods through various incentives, such as supporting clean energy to prevent deforestation by farmers (Cao et al., 2019). The international system's economic and political dynamics are changing. Perhaps the end of the cold war and the worldwide financial crisis (GFC) revived nationalism and isolationism on the international stage (N. Khan et al., 2018).

The latest political developments, such as Brexit and the "America First" anti-regional integration speechmaking of President Donald Trump, confirm that, in the West, nationalism, protectionism, and isolationism have overwhelmed the regional integration (Wilkinson, 2017). As a result of the Global Financial Crisis (GFC), western cultures have begun to realize that conventional corporate techniques and procedures no longer apply (Sirkin et al., 2008). The western nations, led by the United States, have erected tariffs to safeguard domestic sectors in the wake of the GFC, resulting in the worst international commerce in the past 30 years (Bell & Feng, 2021). In contrast, China continues to have views on trade that are completely at odds with those of the United States and the European Union in terms of trade and political preferences (Brands, 2017).

In September 2013 at Kazakhstan, Chinese President Xi Jinping distributed funds for the New Silk Road Economic Belt, which will connect China with Europe, the Middle East, and South Asia. Chinese representatives have now made public their aspirations and interest in investing tens of billions of dollars in the development of partner nation’s infrastructure, mainly the roads, trains, pipelines, and electricity grids that will be updated for maritime logistics and are close to ports. One Belt, One Road (OBOR), often known as the Belt and Road Initiative (BRI), is a land and maritime belt (Hafeez et al., 2018).

According to initial government projections, China would invest between US$800 billion and US$1 trillion in 890 projects across more than 60 partner nations. The BRI, which aims to improve collaboration between Eurasian nations, is the largest single-country endeavor in human history and has the potential to change global trade and incorporate regional

development. According to estimates, the BRI program will have an impact on 2/3 of the world's population, 1/3 of the global GDP, and 1/4 of the world's trade (Hafeez et al., 2018).

In reality, many offshoots will be constructed to link these highways. As a result of the breadth and depth of BRI, a number of strategically important cities and ports will be centered on the expansion of six major economic corridors: the one connecting the People's Republic of China (PRC) to Central Asia and West Asia, the one connecting the People's Republic of China (PRC) to India and Myanmar, the one connecting the People's Republic of China (PRC) to Pakistan, the New Eurasia Land bridge, the one connecting the PRC to the Indochina (Xiong & Tomasic, 2019).

The impact of BRI is difficult to assess since it is influenced by a special combination of domestic and strategic elements. China invests in international transit and logistics in order to advance its global trade and economic links. The Asian Infrastructure Investment Bank (AIIB) and the BRICS New Development Bank are two examples of Chinese-based financial institutions that will benefit from its promotion. It will also serve as a catalyst for attaining cordial political acceptance by partner nations (Rana, 2019). By shifting overcapacity, mainly in the cement and steel industries, China hopes to provide new business opportunities to domestic enterprises, enabling them to serve as a regional representative of the Chinese government when the economy is slowing (Dollar, 2015). BRI is regarded as a game-changer in the making because the nation has never before undertaken a project of this scale, with outcomes that are comparable to the US Marshall Plan in terms of their anticipated scope (Shen & Chan, 2018). Results of empirical research on the connection between financial development and sustainable development are contradictory.

Instead of focusing on integration or a group of interconnected goals, international organizations may see the SDGs as 17 distinct global policy objectives and then narrow their attention to the one SDG that is most closely relevant to their own mandate. The 17 SDGs

would thus have an unintended steering effect that governments and UN officials did not intend: a new siloization around the 17 different SDGs in a system that becomes even more disjointed. After 2015, organizations would group together around issue areas as the SDGs describe them, such as those centered on poverty (SDG 1), health (SDG 3), climate change (SDG 13), and so forth (Boas et al., 2016a).

The UN's goals are inextricably intertwined with the sustainable development of urban ecosystems, sustainable consumerism, and infrastructure, as well as the availability of energy, food production, medical care, and water purification (Maes et al., 2019). Since raising environmental standards can be expensive and beyond the means of smallholders, trade-offs frequently relate to socioeconomic and environmental sustainability (Brandi, 2017). The desired result may be negatively impacted by these trade-offs between socioeconomic and environmental sustainability, either by impairing population well-being or by compromising environmental sustainability (Cazalis & Prévot, 2019) or compelling people to move (West et al., 2006), as well as by enabling environmental degradation to spread to other areas, ultimately weakening the environmental policy (Henderson & Loreau, 2023).

Sustainability generally refers to setting up the environment so that people and nature can live in productive peace and support the socioeconomic growth of both the present and future generations. However, in many poor nations, there is either a lack of the bare basic infrastructure required for applying sustainability or insufficient logistical support for its usage. According to Arshed et al. (2021), around 72% of the SDG targets have a direct connection to infrastructure development, which is a requirement for long-term socioeconomic progress. Generally speaking, the impact of infrastructure provision can be seen as cumulative, with each component having an exponential impact on growth and development (Taghvaee et al., 2022). Small and medium-sized businesses (SMEs) are crucial to the global economy and are widely

regarded as the main engine of socioeconomic growth, job creation, and industrial development (Aftab et al., 2022b).

In order to fulfill the Sustainable Development Goals, small and medium enterprises are crucial (Aftab et al., 2022a). The United Nations introduced the Sustainable Development Goals (SDGs) as a global initiative, serving as a universal appeal to eliminate poverty, protect the environment, and promote peace and prosperity for all individuals. By supporting innovation, employment opportunities, alleviating poverty, lowering income disparities, and sustainable industrialization in developing economies, small and medium enterprises play a crucial role in attaining the SDGs (Littlewood and Holt, 2018). The entrepreneurial-oriented approach is necessary for small and medium enterprises in order to implement and achieve the SDGs (Aftab et al., 2022b).

The literature that is currently available illuminates the crucial role that EO plays in economic growth, sustainable development engagement (Chassé & Courrent, 2018), and firm performance (Orazalin & Baydauletov, 2020), highlighting the small and medium enterprises' motivation to build competencies by increasing their resource investments and utilizing new information. The literature already in existence asserts that businesses are unable to devote resources to social and environmental policies, despite the growing interest in discovering a beneficial relationship between entrepreneurship and sustainable development (Aftab et al., 2022b).

The primary cause of environmental issues, according to neoclassical economics, is the ineffective utilization of natural resources. Due to outside influences, the market has failed, which results in this inefficiency. The economic strategy thus emphasizes setting accurate prices. A suggestion is presented to internalize external costs after various estimation techniques are used. A real illustration is the European Commission's report on "externalities of fuel cycles" (Leloup et al., 2001). Economic strategy-derived metrics such as the

"sustainable income" or "green GDP" are measured in monetary terms. Because monetary indicators presume that manufactured and natural capital are close equivalents, they can be described as indications of poor sustainability. The benefits of produced capital e.g., income can therefore be used to offset the costs of environmental degradation (such as forest loss).

The ecological strategy examines how economic activity affects ecological systems. By preserving natural capabilities like ecological resilience or stability, this technique seeks to maintain intact ecosystems. The ecological strategy's indicators are quantified in terms of physical units. These indicators include critical loads, which measure depositions that could have long-term, serious negative effects on ecosystems. Physical indicators that measure the important ecological function thresholds might be considered indications of strong sustainability since they refute the level of replacement that weak sustainability presumes.

Despite the complimentary nature of the economic and ecological approaches to assessing sustainable development, there has been relatively little success in tying the two ideas together or defining their bounds. However, due to the flaws in all current economic and ecological techniques, such a linkage would be required for an accurate calculation of sustainability. Consequently, integrated methods are essential. Ecological and economic indicator ideas serve distinct functions and cannot be judged using the same standards. In order to promote efforts towards the convergence of economic and ecological indicators, the major goal of this study is to characterize key aspects of various indicator methodologies (Rennings & Wiggering, 1997).

Various studies on social costs incorporate damage cost calculations, which serve as indicators of weak sustainability. Additionally, concepts such as integrated environmental and economic accounting, often referred to as "green GDP," as well as multidimensional socio-economic indices like the "Index of Sustainable Economic Welfare" (ISEW) (Chelli et al., 2013), are utilized as methods to assess sustainability. Calculations of damage costs aim to quantify the impact of environmental degradation on society. Cost-benefit analysis and welfare

theory are the foundations of the methodology. Only the Pearce et al. (1994) example of the damage cost indicator will be shown here due to the limitations of this overview. In addition, the idea of sustainable income will be discussed because it reflects the doubts of many economists regarding the feasibility of estimating damage costs (Hueting & Reijnders, 2004). Damage costs and sustainable income are both ideas that are included in the UN's System of Integrated Economic and Environmental Accounts (Kasseeah & Tandrayen-Ragoobur, 2016).

In order to be more competitive and efficient in the areas that make up sustainable development, entrepreneurs should concentrate more of their efforts within their companies on business ideas that help them balance their activities with the effects that those activities have on the economy, the environment, and society. They should also engage in sustainable practices. Therefore, it would be fascinating to learn whether and in which industries new enterprises assist the shift to sustainable goods and services. Studies examining the connection between entrepreneurship and sustainable development have grown in quantity during the past few years (Dhahri et al., 2021).

For example, Hall et al. (2010) suggest that entrepreneurship promotes sustainable economic growth while providing a solution to environmental problems. According to the authors, there is widespread support among leading academics for the idea that entrepreneurial activity can serve as a solution to diverse environmental and social challenges. They argue that entrepreneurship plays a crucial role in driving the transition towards sustainable practices and products, acting as a catalyst for positive change.

Entrepreneurship can improve agricultural methods, protect biodiversity, and preserve the ecosystem while reducing climate change and environmental pollution. In a similar vein, Youssef et al. (2018) believes that entrepreneurship is the most effective strategy for creating sustainable products and services and launching new ventures that serve a variety of social and environmental needs. Based on data from 66 nations, the author reaches the conclusion that the

connection between entrepreneurship and environmental sustainability is contingent upon the extent of economic growth. By employing data from 17 African nations, Apergis et al. (2018) demonstrates that the link between entrepreneurship and sustainable development is substantially influenced by the countries' levels of innovation ability and institutional quality.

However, the recognition of entrepreneurship as a means to foster a sustainable economy, the investigation into whether the correlation between entrepreneurial activity and sustainable development is influenced by the actions and motivations of entrepreneurs (opportunity entrepreneurship versus necessity entrepreneurship) has not been explored to the best of our knowledge. Furthermore, because the SDGs prioritize attaining economic, social, and environmental sustainability, particularly in developing countries, there is a notable absence of research that specifically examines how the behavior of opportunity- and necessity-driven entrepreneurs impacts the achievement of these goals (Dhahri et al., 2021).

Economic sustainability is described as a production system that satisfies present consumption demands without jeopardizing future demands (Lobo et al., 2015). According to Peng et al. (2016), the supply of natural resources has run out which has led to a reexamination of the conventional economic practices that have been followed. The prevailing belief is that natural resources are finite and, for the mostly are non-renewable as a result of their excessive use towards the economic development. As a result, many academics have been compelled to investigate the viability of excessive natural resource consumption for the purpose of economic expansion.

Economic expansion is the primary goal of economic powers, who push markets by driving up demand for goods and services while ignoring the negative impacts these activities have on the environment, such as pollution and resource depletion (Wang et al., 2018). According to Nousheen et al. (2020), making decisions that are fair and take into account other sustainability-related factors, such as environmental preservation, is necessary for economic

sustainability. The Paris Accords, which were signed by 196 nations, are a result of their commitment to alter their economic growth by switching to more "ecologically sustainable" growth patterns (Piñeiro-Chousa et al., 2022). To lessen the risk of climate change, representatives from 196 countries made a commitment to limit global warming to below 2°C (Matos et al., 2022).

The idea of "social sustainability" is concerned with people; this strategy covers a wide range of issues, including social equity, community development, cultural identity, livelihoods, and institutional stability. It is argued that social sustainability encompasses crucial concerns such as human rights, public engagement, adherence to the rule of law, and the pursuit of justice for the sake of peace and societal stability. Social sustainability seeks to foster the progress of individuals, societies, and cultures towards attaining a fulfilling social existence, which hinges upon factors such as quality healthcare and education, gender equality, and global peace and stability. The goal of social sustainability is to provide favorable conditions so that people can achieve their requirements, if they so choose, rather than to guarantee everyone's needs (Mensah, 2019).

According to Pierobon et al. (2019) any action that might hinder this capacity is viewed as a barrier and needs to be removed in order for social sustainability to advance. However, other researchers have pointed out the complexity and intangibility of the social system, calling attention to the fact that it is more challenging to achieve "social sustainability" than "economic sustainability" or "environmental sustainability," where capital flows and the economic system are more readily apparent (Pirozeh et al., 2022).

At last, the estimation of net forest depletion is based solely on values excluding all external and non-timber advantages linked with remaining forests (World Bank, 2016). Adjusted net saving is clearly a helpful but flawed metric.

2.2 Nexus between financial development and sustainable development

The 2030 agenda prompted the financial systems to re-evaluate their roles and play an integral role in supplementing the state's efforts to channel public resources locally through the identification of creative approaches to fulfil sustainable development goals (Barbier & Burgess, 2019). The SDGs emphasize the importance of local financial market participants actively participating in and contributing to the creation of social value (Van der Waal & Thijssens, 2020), because optimizing domestic resources usage is essential for economic progress and advancement (Uddin & Aziz, 2014). The private sector helps reduce poverty by boosting financial development, which in turn leads to economic growth (Ganda, 2019), which is critical for attaining the SDGs more quickly (Paul, 2020). The private sector helps the process with its skills, including technical innovation and reactivity (Scheyvens et al., 2016) and considerably contributes by offering expertise, experience, and resources (Marx, 2019).

The financial system's development refers to the expansion of the size, efficacy, and stability of financial markets, also encouraged approach to financial markets, which facilitates the country's economy. For example, an advanced financial market directs a state's savings to productive investment (Stiglitz, 2005), reduces the cost of information, which leads to improved capital distribution (Greenwood & Jovanovic, 1990), as well as reduces the corporate governance cost (Ray, 2010).

The theoretical connection between financial development and economic development may be followed back to the pioneering work by (Schumpeter, 1982). He claimed that a well-organized financial system is critical for economic development. Financial development proponents said that an advanced financial system is a necessary condition for industrial development, which was backed up by (McKinnon, 1974) and others (Pagano, 1993). They claimed that economic growth encouraged by liberal financial markets whereas repressive financial markets slow down economic growth. So, they endorsed the implementation of liberal

policies that are critical for maintainable economic development (McKinnon, 1974; Shaw, 1973). Endogenous development theories evolved the importance of financial development as a fundamental contributing factor of economic progress in 1980s and 1990s (Berthelemy & Varoudakis, 1996). According to endogenous growth theorists, financial development supports in improving capital allocation efficiency, managing liquidity risks, efficiently diversifying investor's portfolios, and increasing the investment schemes' efficiency. These elements have the potential to boost capital productivity, which will boost economic growth. However, according to Lucas Jr (1988), financial markets' significance in economic growth is exaggerated in academia debates. According to Schularick and Taylor (2012) and Mian et al. (2014) finance has the potential to become a strong force for rooting the upcoming crises' seeds with unfavorable implications for economic development and social wellbeing if sufficient laws and regulations are not in place.

Financial development boosts economic activity among level of income households by allowing them to take advantage of investment opportunities made possible by easier credit access (Bermpei et al., 2018; Klapper & Parker, 2011). In addition, financial development encourages poorer households to engage in entrepreneurial activity (Ayyagari et al., 2011; Bayar & Stamm, 2018). In emerging countries, economic growth and financial development have even stronger associations but are still in the infancy of economic progress. Deprived economies with underdeveloped financial systems are stuck in a vicious cycle in which weak financial development is caused to the poor economic work that leads to poor financial development (Asongu & Nwachukwu, 2017; Fung, 2009). Some studies such as (Beck et al., 2007; Galor & Zeira, 1993; Sehrawat & Giri, 2017) have shown that a lack of access to financing leads to the formation of both economic inequalities and poverty traps. On the other hand, states with more advanced financial systems are more likely to grow faster.

According to King and Levine (1993) developed financial intermediaries encourage technology innovation by rewarding entrepreneurs. Aside from facilitating goods and service transactions, financial systems aid in diversification, trading, hedging, and risk mitigation (Levine, 1997). He also stated that technological innovation and Capital accumulation are considered bits and pieces between financial progress and growth. The financial system serves as a channel that directs the financial and real sectors by allocating credit, which is utilized to finance working capital requests and fixed-capital investments. And the earlier is employed to boost manufacturing, while the later boosts real-world output (Das, 2013).

According to King and Levine (1993) financial development is a significant factor in enhancing economic development and that governments should have policies in place to encourage the development of the financial system (Levine et al., 2000) followed the (King & Levine, 1993) econometric model and used different regression techniques on sample data of 74 countries from 1960-1996 to analyze the association concerning financial development and economic progress. They observed the development of financial intermediaries positively impacted on growth and implying that legal and accounting reforms aimed at improving the financial sector will improve economic development. A study conducted by Ghimire and Giorgioni (2013) to observe the financial development role in economic development of 120 economies from 1970-2006. They reported that the stock market's growth statistically significantly and positively influences economic growth, though credit to the private sector impacted negatively in the short run period.

During 1971 to 2002, Yang and Yi (2008) backed the theory that financial development encourages progress while rejecting the premise that growth take the lead to financial development in Korea. Financial development allocates the credit to great productive sectors, which certifies quick and sustainable economic development, as stated in the literature (Bandura, 2022). It considered as the engine that drives economic activity by generating

landings and allocating it to the sectors that are most productive (Kasseeah & Tandrayen-Ragoobur, 2016; King & Levine, 1993).

The emergence of financial development creates a market for exchanging financial services, making it simple to connect financial resources to the places where they are most crucial for long-term growth (Modigliani & Miller, 1963). Furthermore, as Schumpeter (1982) points out, credit creation and economic distribution foster innovation. Bolarinwa et al. (2021) stated that financial development strengthens economies' resilience and increases economic growth by ensuring effective resource allocation, mobilizing savings, promoting information sharing, and facilitating diversification and risk management. In addition, financial development encourages financial stability to soften the effect of shockwaves by profound and liquid financial systems as well as a variety of methods.

Furthermore, Gyeke-Dako et al. (2018) discovered that African countries has lower social cost of financial intermediation with advanced financial systems relative to African economies with underdeveloped financial systems. Tchamyou (2019) expressed the significance financial development in Africa by examining the effect of information exchange on financial development in order to confirm sustainable growth. They found that advancement in financial sector directly influences the economic growth within the region.

Using eight economies of West African Economic and Monetary Union as a dataset from 1981–2010, Fantessi and Kiprop (2015) conducted a study to investigates the finance impact on economic progress. They take domestic lending to the private sector as a percentage of GDP being a single substitution of finance. Data were analyzed by GMM and shows that growth enhance the finance influence. Asteriou and Spanos (2019) found that financial development boosts the economic development in 26 European states from 1990 to 2016 before the financial crises but after that it delays economic doings. Cheng et al. (2021) by using GMM, observed that financial development negatively influences the economic development from 2000 to2015

in 72 countries. Abu-Bader and Abu-Qarn (2008) found that financial development has a bidirectional causal association with growth of Egypt throughout the period of 1960 to 2001. By autoregressive distributed lags method, Uddin et al. (2013) observed that financial development impacted positively on the economic development of Kenya in long run. Similarly, Samargandi et al. (2014) found similar results in Saudi Arabia. By collecting more than 40,000 Vietnamese firms' dataset, Tran et al. (2022) looked at how corruption affects the impact of local financial development on firm's expansion.

Y. N. Nguyen et al. (2019) observed that the stock and bond markets contributes the economic development in middle-income nations using the GMM method and other financial development proxies. Their results also demonstrate the bond markets positively influences the economic development in high-income states. Over the period of 1960 to 2003, Anwar and Sun (2011) conducted research on the correlation between financial development and economic advancement in Malaysia. They observed that financial development has constructive influence on economic growth in long run. Shahbaz et al. (2013) using a multivariate framework analysis to study the vigorous associations amongst financial development, energy consumption, trade, and growth. ARDL bounds testing confirms that these variables have a long run association. Their observations revealed a mutually influential relationship between financial development and economic growth.

Wolde-Rufael (2009) by employing Toda and Yamamoto test, found that growth has a bidirectional Granger causal relationship with financial sector. Similarly, using sample of 35 countries from 1961–2015 period, Pradhan, Arvin, Nair, et al. (2018) founds that bidirectional causal relationship exist between economic and financial development. The indirect growth impact of financial development has also been the subject of several other studies. In diverse approaches, Alfaro et al. (2004) describe the crucial functions of finance. Based on their findings, it is evident that financial development plays a vital role in maximizing the positive

impact of foreign direct investment (FDI) on economic progress. In contrast, Kutan et al. (2017) conducted a study examining the correlation between finance and growth in Middle East and North African economies (Ménard & Shirley, 2005), specifically focusing on the influence of foreign direct investment (FDI) and institutional quality. They observed that financial development impacted positively on the economic development of MENA economies.

Nguyen et al. (2022) employing panel data set of 22 emerging markets from 1980 to 2020 period, and data were analyzed by a panel Granger-causality test and dynamic common correlated estimator (DCCE). They reported that financial development has a favorable influence on economic progress and has linear relationship.

Ibrahim and Alagidede (2018) used threshold estimation technique on panel data of 29 sub-Saharan African economies to examine the finance impact on economic growth based on income per capita's initial stages of economies, human capital, and financial development. The result shows that domestic financial development boosts economic progress nevertheless, the finance–growth link is minimal below a specific threshold, while it has a major impact on economic activity for economies above the thresholds. Opoku et al. (2019) use data from 47 African economies from 1980 to 2016 to infer that, there is strong indication that financial development and economic progress are unrelated at most frequency levels as well as some evidenced exists regarding the causality between financial development and economic progress.

Leitao (2010) reported that financial development and economic progress has positive relationship with the sample data of 32 countries (5 BRICS and 27 European Union Countries) during 1980-2006. Adusei (2013) observed that financial development has a favorable association with economic progress for 24 African countries from 1981-2010 by employing a dynamic GMM model. They further supported the evidence that financial development has a bidirectional casualty with economic development by using paired granger causality testing. A

study conducted by Jung (1986) used sample data of 56 countries including 19 developed economies to observe the causality between financial development and economic progress in the postwar period and found that there is bidirectional connection between real and financial variables.

Debate regarding nexus between financial development and economic development is a hot subject in empirical research. According to a large body of scientific evidence, financial development fosters economic development (Levine et al., 2000; Levine & Zervos, 1998). They considered that economic growth can be achieved through well-structured financial system. According to Neoclassical theory, foreign investment promotes growth by bringing in new capital, increasing the workforce, and advancing technology (Malikane & Chitambara, 2017). An extensively developed financial system amplifies the advantages derived from foreign investments (Alfaro et al., 2004) and supports to achieve higher trade balance (Beck, 2002). According to economic theory, a well-organized and stable financial system is also necessary for economic progress because it allows savings to be directed into productive purposes and promoting green economic development (Ahmed et al., 2022).

World Bank defined the term green growth, refers to the growth in which natural resources utilized in efficient manner and minimize the pollution (Fay & Shi, 2012). The notion of green growth aligns harmoniously with the principles of sustainable development (Fernando et al., 2019; Khoshnava et al., 2019) because it incorporates macroeconomic growth, social inclusion, environmental protection, and reduced carbon output, all of which place green growth in the framework of the SDGs (Fei et al., 2021). The literature has documented an association between financial development and sustainable development (Odugbesan & Rjoub, 2020). According to Madsen et al. (2018) financial development encourages sustainable development by reducing the gaps of inequality. Employing panel data of 12 Asian economies over the period of 1990-2014, Koirala and Pradhan (2020) discovered that the financial development

substantially impacted the sustainable development through mechanisms including increasing saving, which leads to higher investment and economic development.

According to the Aust et al. (2020) FDI serves as a significant external investment source for developing nations which helping them to achieve the SDGs in domains such as renewable energy, basic infrastructure, clean water, and sanitation. According to (Weber & Partzsch, 2018), governmental and company's financial growth goals are focused on efficiency and cost savings. Though, a more sustainable society may result from financial development that prioritizes long-term sustainability (Heo et al., 2021). The agenda has prompted financial systems to reexamine their functions and play a significant role in accompanying a country's efforts to channelizing public resources locally by identifying creative ways to make progress toward the SDGs (Barbier & Burgess, 2019).

According to Van der Waal and Thijssens (2020) the SDGs emphasize the requirement of actively participation by local financial market actors and contributing to the creation of social value because utilization of domestic resources in efficient manner is key for economic growth and development. Uddin et al. (2020) stated that the private sector plays a vital role in fostering financial development through various endeavors, such as fostering economic growth and addressing poverty which helps to accelerate SDGs achievements (Hacking, 2019). According to Scheyvens et al. (2016) the sector has technical innovation and responsiveness capabilities that can helps process and considerably contributed by offering expertise, experiences, and resources (Marx & Engels, 2019). While the significance of a sound financial system in promoting economic growth has been extensively studied, the role of a sound financial system in sustainable development is a relatively novel discovery (Van der Waal & Thijssens, 2020). Even though, the concept of sustainable development entreaties to the combination of three recognized factors namely social, environmental, and economic its realization stays elusive (Odugbesan & Rjoub, 2020). Scholarly and political debates have

focused on the contribution of financial development to the achievement of sustainable development.

Nevertheless, empirical results are blended when it comes to the inclusive conclusion about the finance development and economic growth relationship. For instance, one strand of literature such as Levine and Zervos (1998) found that financial growth and economic development has a positive association. The 2nd strand of literature (Nathaniel & Khan, 2020) determined that financial markets had an adverse or non-existent impact of financial development on economic progress.

According to Eryigit and Dulgeroglu (2015) business and institutional environment supported by financial development based on ease of access to the capital and financial facilities, stability, and economic efficiency. A study Ullah, Pinglu, Ullah and Hashmi (2022) argued that financial development provides a great sense of investment decisions and savings regarding the saving mobilization, resource mobilization and trade adjustment. Therefore, all of these factors primarily contributed to the financial operations of the country in order to encourage sustainable development. Both studies of Filiz-Ozbay et al. (2015) and Ullah, Pinglu, Ullah, Abbas, et al. (2021) stated that a well-functioning financial system is required in poverty alleviation (financial inclusion) and reducing the other economic risks. Nations with a good and advance financial system may develop quicker over a longer time, reducing social and economic disparities (financial inclusion) by expanding growth opportunities (Demirgüç-Kunt et al., 2020).

A study conducted by Bist (2018), using panel unit root and panel cointegration analysis to look at the association among financial development, economic development, and social sustainability in 16 low-income countries over a 20-year during 1995-2014. He found that financial development, social growth, and economic progress are supportively linked intertwined.

Being the first empirical study Rahman (2004) was demonstrated that financial development has favorable relationship with economic development. Several empirical studies supporting this positive link regarding financial and economic development like (Galor & Zeira, 1993), (Levine & Zervos, 1996), (Demetriades & Hussein, 1996), (Beck et al., 2000), (Campos & Kinoshita, 2008) studies. Lately, Fang et al. (2020) have employed a novel methodology to examine the impact of financial development on economic advancement specifically for middle-income economies. A study conducted by Hermes and Lensink (2003) to analyze the financial development role in improving the association between the foreign direct investment and economic development in 67 economies especially Latin America and Asian countries. They observed that foreign direct investment has favorable contribution to economic progress in those countries who has developed financial system.

Kenourgios and Samitas (2011) used cointegration methods on data during 1994Q1-2004Q4 to explore the long-run association between finance and economic progress in Poland and found that private sector loaning has been one of the key drivers in Improving economic performance in the long-run. A study conducted by Fink et al. (2009) used the sample data of nine European economies from 1996–2000 to investigates the impact of financial sector segments at various levels of development. The result reveal that financial markets positively contributed to the economic growth and stability in transition economies while transfer methods are not similar for the development cycle. Matei (2020) led empirical research by employing dynamic panel models on sample data of 11 Emerging European Countries from 1995–2016 to investigate the link between finance and economic progress. He reveals that financial development contributes to the economic progress only in the short-run horizon.

Guru and Yadav (2019) employed the GMM method on the sample data of BRICS (Brazil, Russia, India, China and South) emerging states to observe the link regarding financial development and economic development during 1993-2014. They discovered a strong

correlation between financial development and economic progress. Khemani and Kumar (2022) using an ordered probity model and Granger causality test on data of 35 Asian economies to investigate the financial development influence on the sustainable development goals trend. Their findings reveal that financial development positively contributed to achievement of Sustainable development goals.

Moreover, Nguyen and Pham (2021) using the GMM technique on sample dataset of 29 transitional economies and 5 Asian developing states during 1990–2020 to investigate the financial role in economic growth. Their finding demonstrates that financial development is substantial factor of economic growth transitional economies. Bakar et al. (2020) conducted a study by using the GMM estimations on 45 sub-Saharan African (SSA) economies during 1990-201 to analyze the financial development impact on economic progress. They observed that financial sector has robust favorable effect on economic progress in 45 SSA economies. Also, Fathima Rinosha and Mohamed Mustafa (2021) observed that financial development has optimistic relation with economic growth in Sri Lanka. Chen (2006) found that development of financial intermediaries contributing to the economic progress by investigating the connection of financial development and China's growth over the period of 1985 to 1998.

Creel et al. (2015) conducted a study by using panel GMM on sample data set of European Union countries during 1998–2011 to investigate the stabilizing role of the financial system and observed that financial instability is detrimental to macroeconomic performance. Yang (2019) found that financial development boosting economic progress in middle-income economies. Fetai (2018) reported that developed financial systems positively influences the economic growth in 20 European economies. Omri et al. (2015) observed that good financial system improves economic growth by attracting investors in MENA (Middle East and North Africa) economies. This result is supported by Sehrawat and Giri (2016) for SAARC (South

Asian Association for Regional Cooperation) economies and Abubakar et al. (2015) for the ECOWAS (Economic Community of West African States) regions.

Manu et al. (2020) using panel vector autoregressive and the panel quantile regression technique on African economies data set during 1980-2017 to analyze the financial development influence on economic development. The findings reveal that there significant cointegration relationship exist between financial development regardless of the sub-sample for the countries.

Many authors including Odugbesan et al. (2022) have emphasized how financial development aids various indices of sustainable development in their various studies. Weber (2018) however, make a noteworthy argument that while the majority of business and governmental goals for financial development are strongly oriented toward cost and efficiency reductions rather than focusing on social and environmental issues, society would gain most from a surge in sustainable financial development. With the help of a kernel density estimation method, Le et al. (2019) studied the connection between financial development and the entrepreneurial efforts of farmers in Chinese provinces, and they found that expansion of financial development contributed to long-term growth. While, Pradhan, Arvin and Bahmani (2018) use panel granger causality to determine if innovation and financial development are causal agents to sustainable development, they conclude that the two have a sustainable development link (Madsen et al., 2022).

To maximize environmental and financial policy frameworks and accomplish the Sustainable Development Goals (SDGs) in developing markets, it is essential to understand how environmental constraints affect the relationship between economic stability and skewed technological innovation. One of the most contentious problems in the previous several decades' global movement toward environmental sustainability has been the search for a carbon-free biosphere. In order to safeguard the environment for the present generation while

safeguarding the interests of future generations, it is imperative to monitor and regulate human activities, which are widely believed to be the primary cause of global warming. This monitoring is crucial for assessing the commitments made by both industrialized and emerging economies in their pursuit of carbon neutrality. Prominent entities such as the Inter-Governmental Panel on Climate Change (IPCC), the United Nations International Panel on Climate Change (UN-IPCC), the United Nations Climate Change Conference from 2015 to 2021 (COP21-26), and the United Nations Sustainable Development Goals (SDGs) for 2030, all advocate for the mitigation of global warming to below 2 degrees Celsius and strive to achieve a limit of 1.5 degrees Celsius (Ibrahim et al., 2022).

A smooth path to economic prosperity is provided by the nation's financial development (FD), which works in tandem with the natural rent resources contribution to economic progress. A sound financial foundation guarantees the availability of the cash used to increase production capacity, which in turn will increase demand for fossil fuels. Simultaneously, a quick access to the money encourages the import of carbon-intensive goods and degrades the environment. However, it is also necessary for financial development to play a part in achieving environmental sustainability by luring more investment to support renewable energy sources. In order to bridge the funding gap, renewable energy projects rely heavily on financial development. Despite the high upfront costs, many projects ultimately pay for themselves as reliable and affordable power sources once they are up and running. From 2013 to 2018, significant investment was made in offshore wind and solar PV projects. High financial development influenced and encouraged saving, drew foreign direct investment, and encouraged domestic investments, resulting in the growth of technology and capital accumulation (F. Chen et al., 2022).

Financial development can be defined as the creation of a financial system that aids in the reduction and elimination of all costs related to promoting trade, allocating resources and

savings to the most suitable investment opportunities, and distributing risk. However, the methods that are frequently employed in the literature do not take into account all of the aspects of financial information. Therefore, it is intended to quantify financial development using a recently constructed index that combines nine distinct indices to assess the depth, effectiveness, and accessibility of financial markets and institutions. The connection between financial development and economic growth has been the subject of numerous investigations.

With the stock market's volatility and the banking system as control factors, Bayar et al. (2022) evaluated the relationship between stock market growth and economic expansion using time-series quarterly data on France, Germany, Japan, the UK, and the USA. They showed that while stock markets and banks were both capable of promoting economic growth, the stock market's influence was less significant. Estrada et al. (2010) analyze the influence of financial development and economic growth in Asia using panel data from 125 developing Asian nations and the total factor production regression approach. They showed that financial development has a considerable optimistic influence on economic growth in terms of a more complex and diverse financial system.

Masoud and Hardaker (2012) used panel data on 42 rising nations from 1995 to 2006 to examine the connections between financial development and economic development. They observed that there is a long-term relationship between stock market growth and economic development and that it considerably enhanced economic expansion (Islam & Alhamad, 2022). Using Pooled Mean Group (PMG) estimation on panel data from 52 middle-income countries, Samargandi et al. (2015) studied the dynamic relationship between "financial development and economic expansion" and found a long-term reversed U-shaped relationship between finance and economic growth, indicating that too much finance may be harmful to growth.

Examining how financial innovation has affected economic growth in Bangladesh, Qamruzzaman and Jianguo (2017) used annual data during 1980-2016 with Granger causality

and the ADRL bounds test. By utilizing conventional indicators such as bank loans to the private sector and the proportion of broad to narrow money in relation to GDP, they effectively showcased the positive contributions of these indicators to economic growth and established the existence of a reciprocal relationship between the two, highlighting the influence of financial innovation. Using annual data from 1908 to 2014, a comparable analysis used three proxies, such as domestic credit to the corporate sector, wide money, and the deposit-to-GDP ratio for financial development, and analyzed their effects on economic growth in Cameroon. They demonstrated the long-term beneficial effects of all three financial development markers on economic growth.

The relationship between foreign direct investment (FDI), personal remittances, and economic growth in Ghana was examined by Peprah et al. (2019) employing annual data during 1984 to 2015 and the ARDL method. They found that while financial development had a big short-term impact and a negligible long-term impact on economic growth, remittance had a favorable influence on economic growth. However, the synergistic impact of remittances and Foreign Direct Investment proved to be significantly more beneficial for fostering economic growth, whereas excessive financial booms were found to have detrimental effects on economic growth. And the connection between financial development, economic growth, and personal remittances were analyzed by employing panel data during 2000-2015 of 20 Sub-Saharan African (SSA) countries.

The study used Granger causality testing based on VAR and PMG estimation, but it did not use any second-generation unit root tests because of panel dependency. It showed a one-way causal relationship between "financial development to economic growth" and "remittances," but no causal relationship between remittance and financial development. The study also showed that the terms "remittance & financial development" had a detrimental influence in both the short and long terms. Mohamed Aslam and Sivarajasingham (2020)

examined the effect of personal remittances on Foreign Direct Investment (FD) in Kenya. They employed quarterly data spanning from 2006 to 2016 and applied the Autoregressive Distributed Lag technique to analyze the relationship and they showed that remittances had a contributing effect on the latter.

Moreover, Matei (2020) examined panel data over the period of 1995-2016 of 11 developing economies in Europe, applied the PMG model, and looked into the relationship between financial development and growth. A non-linear setting produced a reversed U-shaped relationship with economic expansion, while linear modeling showed that financial development effects economic growth positively only in the short run. Using annual data from 1980 to 2017, Rahman et al. (2020) used the Markov Switching model to investigate the impact of financial development on economic growth in Pakistan. The findings showed that financial development had a more beneficial and substantial impact on growth in high-growth regimes than in low-growth regimes. Data collected from a panel of 44 Sub-Saharan African (SSA) countries spanning the period from 1996 to 2017, were used by Abeka et al. (2021) who then applied the system GMM technique and looked at the association between "financial development and economic growth". They demonstrated that financial development enabled by telecom infrastructure has a favorable impact on the economic growth of SSA economies.

Economic growth is boosted by the development of the financial sector. In the process, it encourages spending on carbon-intensive products and deteriorates environmental quality. As opposed to this, it promotes the use of renewable energy sources and, in some situations, reduces carbon emissions. However, it has not yet been determined how financial development may help China's environment by luring more investment to support green energy sources. The body of literature already in existence fills in this vacuum by discussing financial development issues related to environmental sustainability.

For example, a recent study by, has revealed that Saudi Arabia's economic expansion helps curb environmental degradation and promotes environmental sustainability. Like this one, a prior study in Pakistan (Peprah et al., 2019) looks at the connection between economic growth and greenhouse gas emissions from 1995 to 2018. The results of the ARDL approach verify the beneficial benefits of economic growth on ecological sustainability. Increased access to capital is one result of financial development, which helps developing and emerging economies expand quickly. Additionally, the secure financial system underwrites novel approaches to cutting carbon emissions (An et al., 2019). Additionally, look into how the financial development has affected the 88 developing economies' total carbon emissions both directly and indirectly. The correlation between financial development and CO2 was evaluated using five separate indicators in this study. Their outcome show that between the years of 2000 and 2014, the environment was stabilized through the indirect channels of financial development (F. Chen et al., 2022).

However, the extant literature also emphasizes the detrimental impact of financial development on environmental sustainability. One study, for instance, used a one-of-a-kind sample of 15 emerging and growth-leading economies (EAGLEs) to examine the impact of financial development on environmental quality. The outcomes reveal that during 1984-2018, the FDP caused a dramatic enhance in carbon emissions from EAGLEs. Using data from 1990 to 2014, Saud et al. (2020) examined the influence of financial development on the ecological footprint by using the nations involved in the one-belt-one-road plan as their sample. Researchers concluded that higher financial development levels have detrimental influence on the environment. The detrimental effects of financial development on environmental sustainability have also been endorsed by (Yin et al., 2021) for China and (F. Chen et al., 2022) for USA.

The resource blessing theory was supported in the instance of Pakistan. The acceleration of financial development is the foundation of economic development. The relationship between natural resource development and the growth of financial markets in developing economies during 1994-2017. Natural resource rents are shown to have a long-term, favorable relationship with the growth of the financial markets by the panel estimates. However, no particular influence was found in the near term. The link between finance and growth is benefited by the promotion of natural resources. Additionally, the expansion of financial markets raises national production. The economy of Pakistan looked closely at the beneficial connection between the financial markets development and the availability of natural resources, supporting the resource blessing theory (Billmeier & Massa, 2009).

Moreover, K. Nawaz et al. (2019) by using cointegration and ARDL analysis, the relationship between natural resources and the development of the Chinese financial market was examined. The findings showed long-term relationships and supported the theory of the resource curse. Similar to this, Jie Zhang et al. (2022) a Chinese study examined the detrimental impact of natural resources on the growth of the financial sector. Emerging and developing economies exhibit an inverse correlation in this particular scenario. But the addition of institutional quality, human capital, and trade openness overcomes the unfavorable resource finance relationship.

In economies abundant in oil resources, there exists an unfavorable association between the abundance of oil resources and economic growth was studied by (Rahim et al., 2021). However, the economic support for the expansion of the financial market mitigates the detrimental effects of natural resources. The association between natural resources and financial development has been examined by authors (Rahim et al., 2021). The presence of abundant natural resources in both resource-rich economies and China has a detrimental effect on the growth of financial markets, according to empirical evidence that support the resource

curse hypothesis. Contrary, it was noted by (Rosen, 2022), that resource-rich economies benefit from abundant natural resources. According to the empirical results, countries with lots of natural resources can develop their economies.

Jahanger et al. (2022) innovative contribution to resource abundant economies looked at how the country's financial development is negatively impacted by the expansion of its natural resources. Using panel econometric analysis, it was examined how natural resources affect the growth of the financial markets in the ASEAN economies. The findings highlight how resource abundance hinders economic growth. The adverse correlation between resource rents and the progress of the financial markets was studied in Lin et al. (2023) innovative study on ASEAN countries. Encouragement of corporate rules, however, counteracts the inverted financial resource nexus. They found that the Malaysian banking industry experiences a curse in the form of financial resources which means that the development of the financial market is negatively impacted by the abundance of natural resources.

The inverse financial resource nexus is balanced, nevertheless, by encouraging business rules. In the instance of the Malaysian banking industry, it has been found that an availability of financial resources has a negative impact on the growth of the financial market. The development of the stock (financial) market is seen to be positively correlated with the number of natural resources. Natural resources not only have a negative impact on financial development but also enhances carbon emissions. Though, research recommended improvements in human capital, energy efficiency, financial development, financial inclusion, technological innovation, consumption of renewable energy, environmental regulations, exports, fiscal decentralization, research and development, and investment in pollution prevention (Zhang & Liang, 2023).

It is well acknowledged that technological innovation plays a crucial part in influencing environmental quality. Nevertheless, it has a favorable effect on the growth of the financial

market in several economies. The impact of technological innovation on the growth of the financial market in China was examined Li et al. (2021), The growth of financial markets in high-income economies in the presence of technical innovation has been studied. The empirical findings showed that rising levels of technology progress promote financial market expansion. They examined how technological innovation moderation influences the growth of the Chinese financial industry, which is important for enhancing environmental quality. In addition, they found that the expansion of trade and the financial markets has a big impact on how much technology advances energy efficiency.

Tan (2006) in the instance of China, it was carefully examined how important technical innovation is in fostering the growth of the financial industry. They found that technological innovation contributed to foster the growth of the financial market. According to the empirical findings, innovation considerably improves green finance and a company's financial success, which is essential for the growth of a sustainable financial market. According to the empirical findings, innovation considerably improves green finance and a company's financial success, which is essential for the growth of a sustainable financial market. Mursalov (2020) an innovative approach looked at how the innovation output significantly mediates between financial development and technological innovations. It has been discovered that the growth of the financial market is important for fostering technological innovation, which also helps to reduce carbon dioxide emissions (Zhang & Liang, 2023).

In a seminal study conducted by Christopoulos and Tsionas (2004) the focus was on investigating the long-term relationship between financial depth and economic growth in developing countries. The researchers utilized data from 10 developing nations and employed panel unit root and panel cointegration techniques to analyze the data. Moreover, they considered the presence of threshold effects in their analysis. The findings of the study revealed a significant long-term relationship between financial development and economic growth in

the 10 developing countries under investigation. Khan and Senhadji (2003) contributed to the empirical evidence on the relationship between financial development and economic growth. Their study encompassed a cross-section of 159 countries, including both industrialized and developing nations, over the period of 1960 to 1999. The growth equation was estimated using two approaches: a pure cross-section sample obtained by averaging along the time dimension, and five-year average panels created by taking a five-year average of the original data. They concluded that financial development has a positive effect on economic growth. However, the size of this effect varied depending on different indicators of financial development, estimation methods, data frequency, and the functional form of the relationship.

Chen et al. (2021), claim that the growth of the banking industry produced a more specialized financial system, which not only supports commercial operations but also improves EG. Similar findings are made by Z. Chen et al. (2022), who find that financial development boosts economic growth in the developed world, the EU, and OECD members, respectively. Another study found that economic growth in Denmark was strengthened financially by insurance. They Analyze the relationship between financial inclusion and economic growth in 27 European economies from 1995-2015. They discover that the depth of the financial system, accessibility, effectiveness, and general growth have a noticeably favorable impact on EG.

Similar to this, Z. Chen et al. (2022) note that financial inclusion raises economic growth in diverse nations. Even though the idea that financial inclusion enhances economic growth is supported by numerous empirical researches, still this hypothesis might not always be true. Economic growth faces obstacles such a bad financial system, ineffective financial tools, and bad financial policy. Barajas et al. (2016), contend that not all economic systems exhibit the beneficial effects of financial inclusion on economic growth. In this regard, some researchers have discovered a bad financial inclusion growth link. Up until a certain point, increased financial access by businesses and individuals boosts economic growth; but, in

certain advanced economies, the influence plateaus or even reverses after that point. Similar to this, Barajas et al. (2016) evaluate the relationship between finance and poverty and find that financial inclusion does not lessen it.

Investors are more aware of systemic risk as a result of the global financial crisis of 2008 and the Covid-19 outbreak. Consequently, they have begun to match their financial choices with cultural norms and values. Local and international businesses are under pressure to devote a percentage of their profits to ESG (environmental, social and governance) disclosures as a result of this risk-reducing tendency. According to Lorenzi (2023) the ESG allocation by S&P-500 firms increased significantly from 20% in 2011 to 85% in 2022. ESG scores have been used as the foundation for extensive research to follow socially responsible investment (SRI) efforts. There is a lot of discussion about whether investing in ESG delivers high profitability or just raises investment costs in light of the SRI techniques' hotheaded expansion. For example, businesses that implement eco-friendly production methods stand to gain a competitive edge, which should result in increased return on investment and market value. By integrating ESG practices into their supply chains, emerging market companies set themselves apart from their international rivals. This differentiation approach is regarded as a company's intangible resource.

Businesses are feeling pressure to adopt ESG disclosure as a branding strategy as customers demand creative green practices that aid sustainability. In the context of developing nations, ESG disclosure and financial performance do have a favorable correlation, although this relationship is not widely accepted or repeatable. And inconsistent outcomes are a product of several institutional structures, cultural norms, social systems, governance structures, and human capital. ESG practices have costs connected with them, which is why the study showed a negative association between ESG and financial performance. These expenses consist of External failure costs, which involve addressing hazardous emissions, and internal failure

costs, which pertain to waste separation, are important considerations, appraisal costs (equipment monitoring), and prevention costs (employee training). In contrast to the cost issue, view environmental, social, and supply chain management as a competitive advantage, transforming costs into increased corporate productivity and, eventually, improved profitability.

ESG performance enhances financial success by fostering a positive reputation among stakeholders while lowering risk. Consequently, the importance of ESG disclosures to corporate value is growing (Saini et al., 2022). Linking ESG disclosure with CFP, MNE ESG performance, and ESG country-level risk coverage are three key themes that has been suggested by Linnenluecke (2022) as the focus of future study. As part of a sustainable viewpoint, the current study investigates the relationship between ESG disclosures and CFPs.

In previous decades, researchers have looked at the connection between economic growth and energy demand, and the results are merged. However, several research have indicated that rising economic expansion also results in rising energy consumption. Sadorsky (2010) study looked at the influence of financial development on the need for energy in 22 emerging nations. In addition to the five additional financial development measures (DEA), the author used GMM and a linear dynamic panel model. Empirical research demonstrates that financial development has an optimistic and substantial influence on energy use. An analysis of the significant positive influence of economic growth on India's energy consumption was undertaken using the ordinary least square method. Using vector autoregressive (VAR) author found that Thailand's energy consumption has been impacted by the development of the banking industry and economic recovery. A study used a co-integration method and the Granger causality test to analyze the Philippine economy from 1970 to 2010.

The Fan and Hao (2020) identified a long-term correlation between increasing energy consumption and rising wages. Using data from 2000-2015 and Gaussian mixture model

approach was used to assess the connection between economic growth and energy consumption in 30 Chinese regions. The findings revealed a statistically significant and positive association between energy consumption and the development of the financial sector, considering factors such as the proportion of mortgages catering to economic inclusion in commercial banks and the share of foreign direct investment in relation to gross domestic product (Chang et al., 2022).

Economic growth is enhanced by a sound financial system. It expedites financial institution activism, capital market activity, foreign direct investment inflows, and an increase in the level of overall income. More investments in renewable energy sources and carbon-free projects are made possible by the funds' availability and a sound financial foundation. In order to achieve a high degree of energy efficiency, low-cost financing stimulates technological advancements and renewable energy sources. As a result, to reduce their ecological footprint, it is imperative for the G-7 countries to prioritize financial development (X. Zhang et al., 2022). Though, high financial development boosts economic growth, reduces poverty, and makes financial services more readily available to all members of the economy.

Simultaneously, increased economic activity brought on by financial stability results in greater fossil fuel use, soil and air pollution, and a larger ecological imprint. The G-7 countries are regarded by the IMF as the financial zone with the highest level of development. The G-7 countries' financial development was examined during 1980 to 2018. The increasing trend in economic growth suggests that these nations' finances have stabilized. The USA and Japan have had the highest levels of financial growth. The ecological footprints of these two nations are growing as a result of their high levels of financial development. A study reveals that financial development's involvement in enhancing ecological sustainability is essential given that the G-7 countries make up the most of the world's financial contributors to economic and financial development (X. Zhang et al., 2022).

The influence of financial development on the sustainability of the environment has been often debated in contemporary literature. However, their findings are contradictory. While some studies depict financial development as a positive force for improving environmental quality, other research have shown it to be a negative influence on long-term sustainability of environment. For example, a research study examined the influence of financial development on the ecological footprint of emerging economies, utilizing data spanning from 1984 to 2017. The results, obtained through the application of the CS-advanced ARDL approach, demonstrated that financial development plays a role in reducing the ecological footprint by improving institutional quality and expanding human capital. Similarly, a study by using data from 1990 to 2017 of 15 nations with the largest carbon emissions, found that financial inclusion significantly reduced the EFP by containing the adverse consequences of rapid economic expansion in those countries.

The similar relationship between financial inclusion and ecological sustainability was examined for 52 nations from 1995 to 2017 and it was discovered that the availability of financial inclusion, which ensures access to financial resources, proved to be highly effective in enhancing environmental quality (Baloch et al., 2019). In addition to these, numerous other studies have highlighted the large and unfavorable relationship between financial development and ecological footprint, as well as the fact that financial development lowers barriers to investments in green products and projects. As a result, it is one of the best ways to stop environmental damage (X. Zhang et al., 2022).

Contrarily, an opposing viewpoint argues that financial development and remittances stimulate economic activity and make fossil fuels more affordable. This, in turn, poses a significant challenge to achieving environmental sustainability in BRICS countries (Mehmood et al., 2022). In line with this a study indicated that in Japan, financial development and EFP had a favorable association. They contend that rapid financial development speeds up

manufacturing and increases energy consumption, both of which exacerbate the ecological deficit. The beneficial effects of financial inclusion on environmental deterioration are also highlighted by (Kihombo et al., 2021). Their conclusion highlights that the availability of financial credit, facilitated by an extensive network of bank branches, enhances the capacity of individuals and businesses to invest in energy-intensive projects and products, leading to increased carbon emissions. Another study, N. Liu et al. (2022) examine how the global financial growth affects the ecological footprint of countries in West Asia and the Middle East (WAME) and confirm that it has a negative influence in escalating ecological deficits.

For the Gulf Cooperation Council, it has been demonstrated using cutting-edge panel data estimators that the region's financial expansion accelerates energy demand, raises greenhouse gasses emissions to extremely high levels, and expands the ecological footprint. Additionally, to this research, it was discovered that between 1960-2019 Pakistan's EFP had a favorable impact (Raza et al., 2022). According to theory, the generation of capital is one of the primary channels via which the financial sector contributes to economic growth. For example, the importance of finance in raising the level of national output cannot be denied. Therefore, it is impossible to dispute the contribution of the financial sector in providing capital for investment, particularly in private enterprises. Numerous academics have empirically investigated the impacts of financial development on economic growth under such assumptions. The majority of these earlier studies measured the growth of the financial sector in a country in terms of the share of private sector credit in the GDP.

Albertson et al. (2021) came to the conclusion that expanding the financial system for the private sector, particularly in regards to improving credit availability, is vital for leveraging the economic growth goals in these countries. The study focused on a few Sub-Saharan African countries. Additionally, the authors pointed out that the financial sector's digitalization is more successful at fostering growth. Also investigated how financial expansion in Sub-Saharan

African nations affected sector-based economic growth. In case of Bangladesh, Siddikee and Rahman (2021), discovered that, despite having a modestly beneficial short-term influence on economic growth, financial development actually slows it down over time.

Osei and Kim (2020) conducted research on 62 middle- and high-income economies, and found that financial development indirectly affects growth by reducing the negative effects of foreign direct investment on economic expansion. Although financial development initially aids foreign direct investment in fostering economic growth, the authors argued that after private credit's proportion of the GDP exceeds 95.6%, it can no longer support the favorable association between foreign direct investment and economic growth. The authors came to the conclusion that encouraging stronger economic growth is not possible when there is an excess of domestic finance (a sign of financial development). Similarly, Ibrahim and Alagidede (2018) noted that financial development might be harmful to economic growth if it increases finance for riskier projects in a study that used data from 29 Sub-Saharan African countries. Moreover, Shahbaz et al. (2022) have recently concluded that financial development can have both positive and negative effects on economic growth in the top financially developed world economies, and that these effects are likely to change along with regime shifts regarding changes in the level of financial efficiency.

The process of synthesizing previous study findings and identifying common themes, evidence, and arguments supporting this relationship is necessary to conclude a literature review that demonstrates financial development have mixed effect but majority of studies shows, it positively effects sustainable development. So based on this literature review author proposed a hypothesis:

H_1: There is a positive impact of financial development on sustainable development.

2.3 Nexus institutional quality and sustainable development:

Institutional quality is defined by the World Governance Indicators (WGI) as the practices and institutions that a country uses to exert its authority. This comprises the selection, monitoring, and changing of governments and government's ability to create and execute suitable policies, as well as residents' and the nation's regard for the institutions that regulate economic and societal relations. In this regard as governments throughout the world continue to seek ways to expand sustainable development, the relevance of good governance as a key means for accomplishing this goal has lately been a hot topic in academic and policy, as evidenced by (Bos & Gupta, 2019). Furthermore, the importance of institutions in encouraging progress is crucial for all economies in general, as well as emerging countries, where such institutions are typically promising, and development issues are particularly unfavorable (Fosu, 2013).

Some studies have widely discussed the governance significance in sustainable development (Berkes & Folke, 1998; Carlsson & Sandström, 2008). According to Meadowcroft (2005) the government's traditional activities and other procedures that regulate social connections are linked in governance for sustainable development with the specific goal of fostering sustainable development. According to Meadowcroft (2005), its focus is on the development and execution of government policies, as well as mutual supervising, reflection, dialogue, and decision-making for mechanisms that direct policy. The achievement of sustainable development goals requires efficient sustainable development governance at all stages (Anaedu & Engfeldt, 2002) and (Linnér & Selin, 2013).

The capacity to design and form organizations that are essential for accomplishing the SDGs is included in the concept of good governance (Arslan, 2012). It also ensures that the civil society, private sector, nation or non-nation performers are involved in decision-making process to promote accountability, transparency, the rule of law at all stages, and allows for

competent managing of natural, human, financial and economic resources intending to achieve equitable and sustainable development. According to Kaufmann et al. (2010) the high governance qualities includes political stability, expert government policies preparation and execution, condensed corruption, the absence of terrorism and violence, adherence to the rule of law improved regulatory procedures.

The preceding empirical literature shows that to achieve sustainability needs to focus on good governance (Kaufmann et al., 2010). For example, Costantini and Monni (2008) conducted a study by employing modified version of EKC to investigate the effect of human development and governance quality focusing rule of law, on sustainable progress. The result demonstrate that a positive association exists between them. Corruption and economic progress have an insignificant relationship reported by (Pere, 2015). On the other hand, Mo (2001) reported that 1% change increase in level of corruption will caused 0.72% reduction in level of growth. Aidt et al. (2008) reported that the effect of corruption differs from nation to nation depending on the current political system. It may be argued that nations with strong political institutions are more vulnerable to corruption, but the detrimental effects of corruption are mitigated in the 13 nations with a political regime that is corrupt.

A study conducted by Aidt (2010) to examines the association between several indicator of corruption and sustainable development which determined by genuine investment using data from 110 countries from 1996 to 2007. He found that corruption has an adverse influence on sustainable development. According to the Wang et al. (2021) institutional enforcement is a requirement for abatement policies to be implemented. Institutions can impact sustainable development through various channels. Firstly, through the rule of law, which is explained as a system in which everyone has free and fair entree to justice, as evidenced by (Kardos, 2012). It promotes well-organized legal procedures and sound governance. Secondly, by the transaction cost channel, which includes control cost's negotiations that contributed to

governance. When institutional quality is poor or non-existent, it is difficult to enforce formal agreements between parties, resulting in higher transaction costs which is claimed by (Ménard & Shirley, 2005). Thirdly, through protection of property rights of natural resources (Azam et al., 2021).

Employing property right as a measure of governance (Gradstein, 2004) observed that institutional quality has positive relationship with economic growth. Likewise, Rivera-Batiz (2002) discovered that democratic institutions increase governance and development. In many emerging markets the lack of competent and efficient government is the greatest impediment to country development as per (Gough et al., 2004). In 27 European Union countries, Dima et al. (2013) discovered the favorable quality of government and its positive influence on economic development. Similarly, Sarwar et al. (2013) investigates the institutional quality effect on economic progress in South Asian states. Their results show that governance quality positively and significantly contributed to economic progress of the South Asian economies. According to Devarajan and Nabi (2006) external financing, particularly remittances, and institutions are important drivers that contribute to economic development in SAARC countries. According to Ghani and Ahmed (2009), there are five key drivers for the development of South Asia, namely: infrastructure, market integration, institutions, regional public goods, and inclusive growth.

Bhattacharjee and Haldar (2015a) stated that higher levels of education should be prioritized in the South Asia region for well economic growth. In South Asian countries, Gibb (2009) focused on regional integration, whereas (Morgan & Sheehan, 2015) focused the necessity of governance capacities in maintaining development. Bhattacharjee and Haldar (2015b) found that political stability has an adverse and minor effect on the 4 main countries of South Asia. A study by Drèze and Sen (2013) focuses on the importance of broad-based reforms to combat corruption, increase government accountability, promote social equity, and

improve the administrative efficiency, judicial, and legislative systems. For the period 1996–2012, (Hassan et al., 2020) examined the effect of governance and institutes on education and poverty reduction in SAARC economies.

The governance role in achieving the sustainable development goals has primarily been discussed from a conceptual or normative standpoint (Boas et al., 2016b; Kanie et al., 2014; Meuleman & Niestroy, 2015). According to the De Ceukelaire and Bodini (2020) in globalized world, governance and sustainable development are reciprocally connected. Good governance procedures allow domestic and global investors to freely make investment decisions that resulting in sustainable development.

A study conducted by Emara and Jhonsa (2014) to inspect the relationship between governance and growth of 22 MENA countries. Their findings reveal that governance quality leading a positive contribution to per capita income as well as positive reverse relationship. A study (Raju et al., 2020) utilize sample from South Asian economies to explore the governance's impact on economic growth. Their research discovered that good governance has a positive impact on economic progress. Another study (Abdelbary & Benhin, 2019) conducted to investigate the governance influence on economic development and human capital by using the panel data estimation techniques on balanced sample data of Arab states during 1995 to 2014. They reported that governance favorably influences the economic progress and human capital.

Samarasinghe (2018) investigated the effect of governance on economic development by employing the data of 45 countries over the period of 2002 to 2014. Governance includes the political stability, voice and accountability, absence of violence/terrorism, and control of corruption. He observed that control of corruption is more crucial element indicator for economic progress as compared to other indicators. So, 1% increase in control of corruption triggers to 6.1% increase in economic development. Abdelbary (2018) conducted an empirical

study to examine the association regarding governance indicators and economic development in Egypt for the period of 1996 to 2016, sample data of Worldwide Governance Indicators (WGI) and economic indicators were analyzed by employing VECM technique. Their finding demonstrates that an efficient governance and appropriate initiatives significantly contributing to economic growth of Egypt.

According to Kaufmann and Kraay (2003), governance quality positively and substantially contributed to the per capita income. This case assumes a substantially favorable association regarding good governance and greater income per capita, as well as a poor, and adverse relationship between increased per capita income and improved governance values (Kaufmann & Kraay, 2003). In this case, greater per capita income is associated with stronger governance quality indices, the higher income per capita does not always turn into better governance. According to Alesina and Perotti (1996) political stability is defined as the ability to maintain a steady government deprived of being influenced by constitutional or unconstitutional alterations. The voting power of people within the constitutional framework of country may change the administration or political system.

Samarasinghe (2018) stated that unlawful activities like civil war may result in political regimes to change in some economies. According to Feng (1997) political stability of country can fluctuated because of regular and irregular government changes. The regular change of government is analogous to constitutional change. And the irregular change of government is alike unconstitutional change while the policy changes are minor irregular government changes which are possibly leads to irregular change of government (Feng, 1997). Policy modifications are modest irregularities that must be implemented while maintaining political stability and avoiding investment risk (Feng, 1997). The country's stable political climate promotes the building of both physical and human capital, accelerating the nation's growth process (Younis & Akkaya, 2008).

A study conducted by AlShiab et al. (2020) using panel GMM estimators on sample data of 6 emerging economies and 23 developed countries (29 countries) to investigate the association between governance quality and economic progress. They observed that in both emerging and developed countries governance quality positively influences the economic growth. Tran et al. (2021) conducted a study with sample data of 48 economies in Asia during 2005-2018 to explore the institutional quality's impact on economic growth by employing quantile regression methods. They found that institutional quality is critical factor of economic development in addition, institutional quality more effectively performs in the lower-income Asian countries towards economic growth as compared to the higher-income countries. Gani (2011) observed that government efficiency and political stability positively and significantly influences the economic growth by analyzing the sample data of 84 developing countries to investigate the public governance effect and institutional quality basis on economic development.

A study conducted by Aisen and Veiga (2013) using GMM estimation on a sample data of 169 economies during 1960–2004 to examine the political instability effect on economic progress, they observed that political instability negatively influences the economic growth by reducing the per capita economic progress. Acemoglu et al. (2014) found that democracy rises around 20% GDP per capita in the long-run by using panel data quantile regression and GMM estimation. Vianna and Mollick (2018a) discovered that 0.1% increase in institutional quality triggered to the 3.9% positive change in output per capita by investigating the economic development of 192 Latin American economies over the period of 1996–2015.

A study conducted by Singh and Pradhan (2022) using FMOLS methods and panel causality test on data set of South Asia over the period of 2002-2016 to analyze the institutional quality's impact (governance indicators) on economic performance. So, the finding demonstrate that institutional quality (governance indicators) favorably contributed to the

economic performance in long run while no effect on economic development in the short-run. Bosco and Poggi (2020) observed that government effectiveness is critical to poverty alleviation by investigating the government effectiveness role in poverty alleviation in 26 European Union countries. Similarly, Alam et al. (2017) found that government effectiveness has significant and favorable impact on economic progress by using system GMM method on sample data of 81 economies and they recommended that countries should focused on good governance for better economic development. Oyinlola et al. (2020) reported that governance positively contributed to economic growth by examining the intuitions' role in resources utilization and comprehensive progress in 27 economies of sub-Saharan Africa.

Bhattacharya et al. (2017) claimed that higher investment in institutional quality, physical capital, and human capital are significant to sustainable progress in South Asia countries. Singh and Pradhan (2022) founds that institutions quality is integral components of economic growth than government expenditure in SAARC countries. Arefin and Mallik (2018) reported that there is a trade-off among economic development and institutions in all SAARC countries. Asghar et al. (2020) used Panel ARDL and panel causality test on sample data set of 13 developing economies of Asia during 1990-2013 to explores the effect of institutional quality on economic progress. Their finding indicate that institutional quality favorably contributed to economic development and there is causality between institutional quality and economic development. A study conducted by Hasan et al. (2009) using OLS and GMM on sample data of 31 Chinese provinces over the period of 1986-2002 to examine the relationship among development of institutions quality, finance deepening and economic growth. They found that intuitional development, deepening of finance positively influences the economic development.

The influence of corruption as a key component of poor governance is investigated by (Azam & Emirullah, 2014). For empirical analysis they used simple multiple regression model

on annual panel data from 1985-2012. Data were analyzed by fixed effects and random effects models methods. The findings clearly supported that good governance is noteworthy, they suggested that policymakers should prioritize minimizing endemic corruption and dealing with inflation when developing and executing macroeconomic and public policies. It is critical to go to the base of the problem in order to be most effective in combating corruption. Considering the results, they recommended that corruption should be controlled, and economies be made more transparent in order to get more benefits and accelerated the economic progress and advances. According to Enaifoghe and Maramura (2018),corruption hinders the growth. Therefore, the influence is proportional to the degree of governance, with the worse governance having a greater negative influence on development.

Azam and Emirullah (2014) discovered that corruption affects numerous macroeconomic indicators which caused slowing the economic growth. Furthermore, Pulok (2010) concluded that in the instance of Bangladesh, corruption had a direct negative influence on GDP per capita. During the period from 1985-2011, discovered that persistent corruption has statistically significant and a negative influence on economic progress in 5 East and South Asian economies. According to Dzhumashev (2014), increases in government expenditure may result in bigger social losses due to increased corruption and government inefficiencies. Therefore, low-income countries' economic growth has slowed. As per Ertimi and Saeh (2013), corruption inextricably influences the economic growth via trade and foreign direct investment, which was proven by theoretically and empirically. A cross-country analysis conducted by Dridi (2013) for 82 countries including developing and developed states from 1980 to 2002. As a result, the findings revealed that corruption is negatively influences the economic growth which is mostly conveyed through its influence on human capital and political volatility.

A study conducted by Iheonu et al. (2017) to investigate the institutional quality’s effect on economic performance by employing panel data set of West Africa from 1996-2015. Their

outcomes indicate the rule of law, regulatory quality, government effectiveness, and control of corruption are significantly and positively influencing the economic performance. Beyene (2022) using 22 Sub-Saharan African economies to conduct a study for analyzing the role of governance quality in economic development. Data were taken from World Bank database and processed by GMM estimation technique during 2002-2020. The results show that composite governance index positively and significantly influences the country's economic progress.

Kilishi et al. (2013) using GMM estimators on sample data of sub-Saharan Africa to investigates the institutions and economic performance and they found that institutions have significant influence on economic performance especially government effectiveness and regulatory framework in sub-Saharan African. Valeriani and Peluso (2011) employed pooled regression model and a fixed effects model on sample data of South Asia, Europe and Central Asia, East Asia and Pacific, Latin America and Caribbean, North America, Middle East and North Africa, Sub-Saharan Africa during 1950-2009 to examine institutional quality's impact on economic progress and advancement. Their findings reveal that institutional quality positively influences the economic progress, but its size and magnitude differ across regions. Finally, institutions may influence sustainable development by enforcing law. Taxes, fines, and imprisonment are used by a well-established institute to encourage the enforcement of official rules and regulations. According to Shahzad and Research (2020) through substantial tax collection, enforcement increases financial potential which support to further sustainable development agenda.

On the other hand, natural resources are defined as the supplies of minerals, wood, gas, and oil that are present in a nation. In addition, the natural endowment theory also included the development of technical innovation, institutional quality, and human capital resources in the form of population-level's knowledge and skills. Nevertheless, the studies are only conducted at the country level, i.e., China, USA, etc. The research that chooses panels related

to institutional quality, innovation, and human capital are characterized as having inconclusive results. In the G7 countries, the short- and long-run analyses of the resource-curse hypothesis revealed that natural resources were a blessing in the long run while being a curse in the short run, and 40% of studies shown that there is no relationship between institutional quality and financial development, and 20% of studies found a positive relationship. However, they fail to mention the other resource-rich and high-income nations that may add further context to this discussion. Therefore, more research into how innovation and human capital are related in, resource-rich and high-income nations may be worthwhile.

Hussain et al. (2023) the study is re-evaluating the preceding premise in order to offer the following grounds for understanding the literature on development economics. First, this study has investigated the impact of institutional quality, human capital, technology innovation on financial development in 23 resource-rich high-income nations. Financial development is measured by the accessibility, depth, and efficiency of financial institutions and markets. Second, this study utilizing the most recent data set from 1992 to 2017, all hypothesized associations will be experimentally tested using second-generation econometric techniques like CD test, CADF, and CIPS unit root estimates. All types of data difficulties, such as stationarity, cross-sectional dependence, which also addresses heterogeneity, serial correlation, etc., can be handled by these tools (Hussain, Ye, Bashir, et al., 2021).

Depending on the quality of the institutions, financial development varies in countries with abundant resources. Therefore, the level of institutional comprehension is crucial. So, institutional quality is important for promoting financial development. Nawaz et al. (2021) however, higher resource development can result from good institutions in countries with abundant resources. In addition, the country's strong legal system, low level of corruption, political stability, efficient bureaucratic procedures, protection of property rights, and alluring investment environment can encourage all stakeholders to create an environment where natural

resources can be turned into blessings and vice versa. The resource curse of some categories may still persist, according to a study by (Badeeb et al., 2017). They contend that additional study is necessary to disprove the resource curse theory. Nawaz et al. (2021) recently reexamined the role of institution quality in the context of the resource-curse theory and discovered that a higher institution quality is helpful in boosting financial development in BRIC countries (Brazil, Russia, India and China). The high-income economies with abundant resources, can provide a different picture.

Additionally, by using corruption as a stand-in for institution quality, corruption's effects on human capital and financial development are restrained in Gulf nations. Results show that corruption and human capital are negatively correlated. However, because the study was unable to conduct an extensive investigation of institution quality, it cannot be deemed conclusive. Considering this chaos in nations with abundant resources is intriguing. Additionally, contrasting the low-, middle-, and high-income nations with resource abundance will produce additional intriguing results in the body of research already in existence. According to Gathmann and Schönberg (2010); Nathania and Sandroto (2022) human capital is important for economy. There are numerous ways to define human capital, but to put it more simply, "Human capital is the skills and information that a person, group, or population possesses that may be put to productive use" for the particular business or nation. The importance of human capital at both the micro and macro levels cannot be understated. For example, skilled labor plays a role in the organization's production at the microlevel. It wouldn't be incorrect to claim that human capital is a crucial component of production in the absence of labor capital, just as financial intermediaries are in the creation of financial markets.

Hussain, Ye, Ye, et al. (2021) looks at how human capital might help OECD economies' financial progress. They discovered that the availability of natural resources was a blessing, and that human capital also aided in development. They were unable to identify the part that

human capital played in high income, though. Measuring human capital's contribution to economic and financial development is a difficult issue at the macro level. Therefore, many indicators described in the literature are employed as a proxy to measure the qualitative part of human capital as a result of the measuring understanding of human capital at the macro level. Indicators of economic growth, such as human development, are increasingly available from sources like Penn World Tables. The average number of years spent in school and the return on investment are related to an index of human capital per person. Therefore, more research into the development of human capital and finance in high-income economies with abundant resources is a fascinating and original contribution to the literature.

The application of institutional theory as a theoretical framework to explain how businesses behave in various institutional contexts has been widespread and consistent. There is a substantial and growing body of research on how the institutional context affects corporate sustainable performance (Al-Hakimi et al., 2022). Institutional theorists have proposed that institutional issues should have a bigger impact on corporate sustainable performance. Better performance in the areas of the economy, environment, society, and governance are correlated with strong institutional quality (Karmani & Boussaada, 2021). The institutional theory's proponents contend that organizations' behavior is influenced by their institutional environment since these organizations' values, preferences, action repertoire, and rational behavior in regard to sustainable business practices are shaped by the institutions. The argument goes on to assert that businesses want to maintain or grow their legitimacy through sustainable endeavors.

Based on this logical progression concerning sustainability strategies, previous studies have indicated that companies demonstrate strong sustainable performance in order to gain acceptance and credibility in response to institutional influences.

Additionally, these studies have revealed that when confronted with substantial institutional pressures, the probability of corporate scandals decreases while ethical business

practices become more prevalent. Because enterprises are anchored in a diverse range of political and economic settings that influence their behavior, the higher the Institution quality, the better the corporate sustainable performance. The institutional environment of a nation has a substantial impact on a firm's decision-making process as well as a shift in behavior toward sustainable paths. It is defined as the "rules of the game" and influences the effectiveness and legitimacy of organizational tactics. In the macro environment, this phenomenon is also known as institutional isomorphism (Karmani & Boussaada, 2021). It conceptualizes the connection; it demonstrates how the larger institutional environment affects corporate sustainable performance. Additionally, companies that actively engage in corporate sustainable performance can enhance their performance by surpassing stakeholders' anticipations within the framework of firmly established institutional frameworks (Laczniak & Murphy, 1991). Serving more stakeholders enhances the company's brand and its perceived validity (Ghoul et al., 2017).

Institutional theorists also contend that the pressure from stakeholders serves as a motivator and the firm's desire to seem legitimate serves as a facilitator both of which have a substantial impact on corporate sustainable performance improvement. Researchers recognize the impact of not only formally established institutions like laws, rules, and contracts, but also of informally established institutions like behavioral norms and moral codes derived from a wide range of sociopolitical ideas (Matten & Moon, 2008). As a result, the formal and informal levels of the institutional environment can affect corporate sustainable performance and inspire more environmentally friendly manufacturing. They also used quantile regression analysis to show changes in the association that had been noticed. The results support earlier economic models and also showed that institutional quality has a varied effect on corporate sustainable performance.

These findings reveal an empirical link between institution quality and corporate sustainable performance, adding to the body of knowledge in the fields of corporate governance, sustainability, and public management. This result can assist the government and policymakers in realizing the value of high-quality institutions in ensuring corporate sustainable performance, which will ultimately aid in the implementation of the European Green Deal and the UN Sustainable Development Goals. The discussion about the harmonization of corporate sustainability performance reporting in the European Union (Korca & Costa, 2021) may be calmed in part by these findings, which may also be helpful to practitioners and academics. Nonfinancial reporting was previously optional; however, new directives have made it legitimately and institutionally mandatory for major enterprises that comply with the reporting standards (La Torre et al., 2020).

There are some recent studies which concluded that the institutions positively contributed to the economic growth (Alexiou et al., 2018; Ha & Lee, 2016; Ngo & Nguyen, 2020; Salman et al., 2019; Vianna & Mollick, 2018b), Several studies conducted to investigates the link between good governance and diverse economic growth output (Cooray, 2009; Farag et al., 2013; Holmberg et al., 2009; Kim et al., 2018; Sacks & Levi, 2010).

In summary, previous studies in the literature review section shows that institutional quality has a positive contribution to the sustainable development in different regions. However, author has not found any study that considers institutional quality as an independent variable in BRI countries. The literature review provides the foundation for creating hypotheses in the context of the proposed study.

H_2: There is a positive impact of institutional quality on sustainable development.

2.4 Nexus between population characteristics and sustainable Development

Population characteristics share refers to the population age groups which defined as follows: children and adolescents under the age of 15 who are reliant on their family make up the first category. The working-age population being the second category which ranges from 16 to 64 years old considered as an essential determinant to contribute to the country's sustainable development. People in the third group, who are 65 years or older and rely on their savings. From a societal standpoint, everyone should be able to maintain their existing lifestyle after superannuation or in elderly age, even if this is not reasonable given existing savings rates. Consequently, a large portion of the population relies on government support via a safety net that burdens upcoming generation. The link between working age populace shares and sustainability has been examined by (S. Dietz et al., 2007), who reported that population characteristics populace share (16 to 64) significantly and positively contributed to the sustainable development.

According to Hesse-Biber (2010) understanding the working population age share group ranging from 16 to 64 considered as an element that supports sustainable development (e.g., rate of adjusted net savings) plans. He discovered that a ratio of the working-age populace had a favorable impact on the adjusted net saving rate which taken as a substitute for sustainable development. The average schooling years of the 25-year-old population are used to calculate the initial distribution of social capital. The demographic population characteristics demonstrated in dependency pressures that effects the ability to save aside money from domestic income. The growth in the population ratio below the age 15 (young dependents) to the overall population or older 64 (net producers) leads to a requirement for a larger income percentage for the existing social welfare spending (education, food, clothing, and healthcare) of children, which is included in estimating the national income as consumption expenditure.

According to the life cycle theory of spending, a rise in the population's segment aged 65 and up (elderly dependents) will result in a reduction in the domestic saving rate as a larger population segment enters the ending ages and medical aid costs for the elderly rise. The weights of dependency on young people and the elderly are usually inversed, with the former decreasing through the fertility change and the later increasing with the alternative method of fertility. A state gets a 'demographic dividend' from an increasing labor force age, but due to the commencement of fertility deterioration, a major fall may arise years later. Because the population characteristics in the BRI countries is vital to examine, the average proportion of the population age range 15–64 across the study duration (APL) was employed to describe the population characteristics as a factor reported by (Destek & Sinha, 2020; G. W. Hess, 2010).

Some studies confirmed that there is adverse influence of population aging on economic growth (Barslund & Gros, 2016; Bloom et al., 2010; Vargas-Silva, 2014). Various studies (Irmen & Litina, 2022; Pham & Vo, 2021) claim that per-capita GDP has a positive association with working-age population while adverse association with percentage of youth and elderly. Generally, Population aging is linked with reduction in workforce size, savings, productivity, and increase in government consumption (Andrle et al., 2018; Castro & Lopes, 2022). On the other hand, population characteristics change has positive correlation because of improved workforce size and economic development which raised savings and investment (Z. Liu et al., 2022).

The population's population characteristics or dependency ratio is more significant for economic development than the population size (Guest, 2011; Macunovich, 2012). R. Mason (2003) Neoclassical economist claimed that population's size and economic development has a negative connection. Kuznets (1960a) found that increases in population leads to increase in per capita output.

In the last three decades, the empirical literature has emerged regarding the association concerning population characteristics and economic growth. So, one aspect of the literature highlights that demographic data is incorporated into the convergence growth model, which used to determine the impact of population change on economic growth (Barro & Sala-i-Martin, 2004; Barro, 1991). For instance, a study conducted by Bloom and Williamson (1998) to investigate the demographic transition relationship with East Asian economic marvel from 1965 to 1990. They discover that remarkable demographic transitions in regions with a working-age populace expand faster than the total population, accounting for nearly a third of the region's phenomenal growth. The second aspect of narrative looks at the connection between demographic and economic via the lens of accounting e.g. (Zhang et al., 2015), which highlighted the age structure's influence on several productivity variables.

For instance, Kögel (2005) conducted cross-country research using the accounting paradigm and found that total factor productivity (TFP) negatively influenced by youth dependency ratio which is unfavorable to economic growth. Despite that population characteristics plays a critical role in the economic growth process. Most of the empirical studies exclusively focused on the uneven growth regarding dependency ratio and working-age population, while the working-age population's internal demographic composition has been mostly ignored (Zhang et al., 2015).

A few prominent exceptions are Lindh and (Gómez & Hernández de Cos, 2008; Lindh & Malmberg, 1999a) who focus on the connection between working-age population's composition and economic growth. A study on the OECD from 1950 to 1990 was conducted by Malmberg et al. (1999) to investigate the population characteristics effect on economic growth. They found that the upper middle-aged group (50–64 years) was positively correlated with the growth rate. Feyrer (2007) conducted a study with panel data of 87 nations and found that there is a clear and substantial link between the changes in workers' population

characteristics and worker productivity growth, whether they are moving from any other age group to the 40–49 age group, which relates to better worker productivity. Contrasting the two previous investigations, which precisely used age group breakdowns so, to quantify demographic maturity, Gomez and De Cos (2008) use only two demographic variables: the working-age ratio to overall population and the prime-age ratio (35–54 years) to working age. Their results indicate that since 1960, demographic maturation has accounted for roughly half of the change in global GDP per capita.

According to Ven and Smits (2011), the changing population characteristics in the population causes variations in the demographic composition in different countries around the world. In addition, their research highlighted the realization of the age structure's significance towards economic progress in research conducted in late 1980s and early 1990s. They show that a decreasing child-to-youth ratio increase the opportunities for economic growth, lowering the dependence ratio and expanding the labor force.

As a result of a per capita turn in the working-age (15-64 years) population, there is a conversion from per worker output to per capita output in the country in accounting terms (Kelley & Schmidt, 2005). Thus, most of the empirical studies concentrated on the populace growth rate and economic progress contempt the integral role played by population characteristics in the economic growth practice. Because the working-age (15 to 64 years) people are active population and contributes significantly to a country's GDP, recognizing the structure and keeping a careful eye on changes in the structure can help with economic planning and decision-making, while ignoring it leads to many issues (Adenola & Saibu, 2017).

Using the vector autoregressive model (VAR), Safdari et al. (2013) examined the influence of population characteristics on Iranian economic development. They discovered that the gross domestic investment, government consumption, trade, and the age group ranging 15 to 64 years are positively influencing the economic growth, whereas the age set 0 to 14 years,

65 years to above, and inflation has an adverse impact. Ven and Smits (2011) used a multilevel convergence growth model on sample data of 367 districts across 39 emerging economies from all the regions of growing world to examine the window demographic of opportunity in developing economies regarding population characteristics and nationwide economic growth. The empirical findings demonstrated that two the proportion of the working age populace and the pace at which it grows have a considerable beneficial effect.

Song (2013) using OLS regressions on sample data of 13 Asian countries over the period of 1965-2009 to investigate the demographic changes impact on economic growth. Their finding shows that young population and total population negatively influences the economic growth while the working people ratio and working population positively contributed to economic progress of the selected Asian economies. So, these results show that favorable change in demographic have had a significant impact on speedy-growing Asian economies.

The dynamic panel GMM approaches were utilized in studying age structure, education, and economic progress in 105 economies by (Crespo Cuaresma et al., 2014). They first explain why changes in population characteristics is important, and then reevaluate the pragmatic confirmation on the association among changes in age structure, education, and economic growth. They discovered that if the impact of human capital dynamics is measured there is no indication that changes in population characteristics influences labor efficiency. The findings show that progress in human capital progress should be granted special attention because it is critical to increasing efficiency and income growth. Adenola et al. (2017) using of Vector Auto Regression estimation technique on sample data of Kenya to analyze the influence of population change on economic development. They found that population growth and economic development have favorable association. It indicates that population growth certainly boosted the economic development.

A study conducted by Zhang and Zhao (2014) using sample data of 28 Chinese provinces to investigate the economic implications of demographic age structure. According to their findings Changes in population characteristics and working population age are highly contributed to rates of economic growth of provinces. Research conducted by Uddin et al. (2017) using DOLS, FMOLS and VECM on the sample data of Australia over the period of 1971-2014 to examine the relationship among demographic variables, real GDP per capita and savings rate in Australia. They found that changes in age patterns of population significantly contributed to real GDP per capita.

An empirical study conducted on 10 Middle East economies from 1996-2016 by Bawazir et al. (2020) to investigate the impact of change in demographic and economic progress. Data were analyzed using static linear panel data models, which revealed that the old dependency ratio and all ages of the worker population's growth rate have a positive influence on economic growth, whereas the young dependency ratio has a negative influence. As per the gender analysis, female working-age population contributed less to economic progress than male working population age.

According to the Bloom and Canning (2011) population characteristics and population growth significantly influences the economic progress. Furthermore, they stated that teenagers (15–20 years of age) are of working age, allowing the countries to grow swiftly. Wei and Hao (2010) found that demographic population characteristics significantly contributed to economic growth in China due to reduction in youth dependency ratio because of lower fertility. Aiyar and Mody reported that growth rate of working population age in India considerably influences economic progress. According to Ahmad and Khan (2018) increase in growth rate of working age population ratio and labor force favorably contributed to economic progress of developing nations.

A study conducted by Z. Liu et al. (2022) using OLG model and numerical simulation method on sample data of China to examine the relationship among changes in whole population, structure, and development. They observed that aging labor force contributed to the sustainable development in China. The population size is less significant for economic development than the population's age distribution or dependency ratio (Guest, 2011; Macunovich, 2012). Mason et al. (2003) a neo-classic economist, discovered an adverse relationship between population size and economic development. Kuznets (1960b) found that increase in population turn to lead increase in per capita output. Kelley and Schmidt (2005) discovered that population change influences economic growth in both positive and negative way.

According to Kelley and Schmidt (2005) changes in population characteristics have a considerable influence, but overall population does not influence the economy. Because a rise in the overall population not always imply a rise in the laborers. Prskawetz et al. (2007) and Jeong and Feiock (2006) came to analogous results concerning the favorable impact of population characteristics on economic development, although these results were not in line with the Swedish setting by (De la Croix & Delavallade, 2009) did not corroborate these findings in the Swedish context. David E. Bloom et al. (2001) discovered that the working population age has a significant and positive influence on GDP per capita rather than overall populace.

Kelley and Schmidt (1995) used European panel data over the period of 1970-1980 and found that young dependence ratio has a favorable and substantial influence on growth rate of per capita output. Likewise, Bloom and Williamson (1998) concluded that percentage of working population age more influences output per capita as compared to the overall population. Barro (1991) model shows that a lower fertility rate is positively associated to higher output per capita growth, that minimizes the negative savings rate impact of a high-level

young dependence ratio. Mason et al. (2016) discovered that low dependency ratio is one of the driving reasons behind rising per capita income in addition, states with a lower dependency ratio have a greater savings rate. In the same way Bloom et al. (2004) found that improved endurance can stimulates larger savings.

The discussion centers on two opposing viewpoints: those who believed that population changes encourage economic development (Grossman & Helpman, 1991; Kremer, 1993a; Kuznets, 1967; Simon, 1976) and those who considered that it limits the economic progress (Barro, 1991; Mankiw et al., 1992; Mason & McDaniel, 1988; Smith, 1776; Solow, 1956). Those who said that demographic shifts accelerate economic development, on the other hand, feel that a greater population promotes innovation, that enlarges the economy's size. Kuznets (1960b) found that population changes can boost economic growth by increasing productivity, consumption, and savings. Kremer (1993b) highlighted the larger populations positively contributed to upgrade living standard. A third point of view argues that population shifts have little economic impact. In their cross-country investigations, (Ehrlich & Lui, 1997; Landreth, 2002) give evidence to support this claim.

In the context of Poverty and environmental sustainability: According to estimates, 1.2 billion people relied on an income of less than US$1 a day to survive in absolute poverty in 1998 (Roe, 2004). Another 1.6 billion people made less than $2 every day. Despite an increase of 250 million individuals residing on an income of less than $2 per day, the overall population in this economic bracket has remained stable over the past decade. The developing world's rural areas are home to about two-thirds of the world's poor, who might make up anywhere between 50 and 90% of the population (Reher, 2005). In 114 developing countries, there were reportedly close to one billion rural poor people in the late 1980s. There is widespread agreement that agricultural development cannot end extreme poverty, but there is also little doubt that chances to significantly reduce rural poverty would be much smaller without the

long-term and large growth of the agricultural sector. Because in 2000, rural areas still housed about 60% of the developing world's population (Reher, 2005).

Based on the data, it appears that locations with the highest rates of population growth between 1951 and 1981 also had the highest levels of land vulnerability (Salvati, 2012). This finding is supported by data showing a correlation between a greater level of land vulnerability and towns in the third cluster (characterized by a medium-high population density and a significant growth rate in 1951–1981). There was a growing spatial concordance between land vulnerability and population density during the last century, as measured by observations made at the same scale in each year of the investigation. Between 1951-1981, authors find the strongest link between population density and land vulnerability. Scores on the first principal component analysis (PCA) axis (the axis indicating the "burst" demographic phase happening during 1951–1981) were positively connected with the degree of land vulnerability, which was a surprising finding. The strongest association was seen between 1951 and 1961. Nonetheless, after 1981, there was less of a link between population density and land vulnerability.

This indicates that urbanization was taking place in a new spatial structure in the region of southern Italy, which had previously been very segregated and rural. This shift was most likely brought on by polycentric growth, which mirrored the increasing DE concentration in the largest cities and expansion far outside the conventional metropolitan zones (Hoyler et al., 2008).

There is a strong correlation between poverty and environmental degradation on a worldwide scale. In a phrase that summarizes commonly held notions, the influential Brundtland Commission noted that poor people are thought to be the most vulnerable to natural resources deterioration because they are forced to abuse their surroundings for short-term survival. Despite these logically sound assertions, the argument over the features of poverty-environment interaction has been compared to a puzzle in which authors have some of the

parts, have found some key connections and features, but lack the complete image. In the face of recent economic and social decline, particularly the prevalent issue of poverty in rural areas, the importance of building networks and fostering trust at the local level is seen as crucial for regeneration and revitalization. This concept is closely related to social capital, which encompasses the norms, networks, and sense of community that foster trust, especially in rural sectors (Asadi et al., 2008).

Furthermore, Song et al. (2011) when a greater working age population utilized efficiently it would improve the health care and nutrition that eventually improve living standard thus infant and child survival rates increases. According to Castelló-Climent (2019) population characteristics reflected in dependency burdens, and it can influence the capacity to save from a provided domestic income. A significant sustainability relationship among environmental, and social, aging-friendly, and economic sustainability evidenced by (Qian et al., 2019; Zagheni, 2011). As per the Rosado et al. (2017) view regarding sustainable work life, that is critical to all age-groups of people particularly when working life has been extended to elderliness. Thus, because of population characteristics dependency difficulties, it is critical to evaluate and create a maintainable work-life balance in maximum economies.

By employing panel fixed effects and quantile regression methods, Pham and Vo (2019) led a study to investigate the aging population influence on economic progress of 84 developing economies from 1971 to 2015. They reveal that higher young people dependency share (14 years or younger) negatively influences the economic progress in long run for 84 developing economies while old dependency share (65 years old or above) is positive in long run towards economic progress.

With the support of the life-cycle theory and previous studies author conclude the literature review, an increasing population percentage entering the breakdown years and rising healthcare costs for the older while earning population has a positive impact on sustainable

development. So based on literature and theory, the current investigation proposes the following hypothesis:

H_3: There is a positive impact of population characteristics on sustainable development.

2.5 Control Variables:

2.5.1 Inflation and Sustainable Development:

Ademola and Badiru (2016) defines inflation as a circumstance in which the overall price level of a broad spectrum of products and services grows over time. It is formed as the rate of change of those general prices during a certain time period. According to the neo-classical and their followers, Inflation is considered basically a monetary occurrence. Friedman (1994) stated that inflation is always and universally a monetary event, and it can only be created by a faster expansion in the supply of money than output. Inflation is one of the highly significant indicators of a country's economic welfare, addressing a macroeconomic issue of sustainability. The economy's overall functioning is reflected by a long-standing increase in the over-all price level of products and facilities, which is represented by a decline in the acquiring ability of a monetary unit. It is the modification in the overall price index over a year, typically the consumer price index (CPI). The CPI is a statistically weighted assessment of a set of products and services' prices. This price index represents price fluctuations for a particular set of products and facilities (Girdzijauskas et al., 2022).

Economists define inflation as a persistent and continuing rise in a country's overall price level (Akinsola & Odhiambo, 2017). Inflation considered as an economic growth's determinant among several factors (Barro, 1995). According to structure lists inflation is necessary for economic growth while monetarists argue it is destructive to economic advancement (S. A. R. Khan et al., 2018). The dominating goal of most of the macroeconomic policy is to maintain a high rate of production growth while keeping inflation low (Fischer,

1993; Koirala et al., 2015). Inflation causes people to lose faith in money as a medium of exchange, that caused fewer savings, investment, and economic growth. In several economic studies, recognized that investment is a primary channel via which inflation smothers the economic development (Barro, 2000; Hussain et al., 2011).

In other words, a high rate of inflation stifles economic growth. In today's environment, an economy with little or no growth is constantly tied to key challenges like poverty, poor welfare, and unemployment (Ayd, 2016). To ensure sustainable economic progress, each country's inflation thresholds must be determined (Omarova, 2020b). As per the study of Arby and Ali (2017), the low rate of inflation is considered one of the indicators of macroeconomic stability and a lower inflation rate is associated with a stable economy (Gylfason & Herbertsson, 2001).With the passage of time, a widespread consensus develops that moderate inflation supports economic growth, contrasting with excessive prices, which can cause uncertainty and disrupt economic performance (Mubarik & Riazuddin, 2005).

The main objective of macroeconomic policies is to accomplish a great and maintainable production growth while keeping low and constant inflation rates (Rousseau & Wachtel, 2002). To "Grease the Wheels," a certain inflation level is required for sustainable economic progress (Mallik & Chowdhury, 2001). So, policymakers must grasp the inflation-growth relationship in order to make appropriate policy decisions if inflation is negative on economic growth. The literature on inflation's influence on growth is diverse and controversial. The desired inflation regime for an economy is one of the issues which is most discussed. For a long time, policymakers and experts wished for low inflation in order to achieve greater price stability in conjunction with good economic growth. While inflation is an important factor in determining growth, countries in currency unions and developed countries prefer to keep it low. This can be accomplished by establishing an inflation target that should not be exceeded.

As a result, inflation targets are viewed as economic policy instruments that must be used to keep the price level under control.

The inflation and growth connection has been theoretically and empirically subjected in recent years. Previous research shown divers results, and studies can be categorized as making probably four predictions. Such as the 1st one is inflation has no relationship with economic expansion. The second point is that inflation is positively correlated with economic growth. The third point is that inflation has a detrimental influence towards economic growth. Moreover, Feldstein (1996) stated that equilibrium rate of inflation shifting from 2% to 0% leads perpetual welfare gain which is equal to around 1% of gross domestic product (GDP) a year. The fourth and last types of studies proposes that there is nonlinear correlation between inflation and growth and below a certain critical level, the interaction between these two variables is positive or non-existent, but it influences the economy when it exceeds that threshold. Dornbusch and Fischer (1993) recognize the possibility of such a non-linear relationship and claimed that whereas inflation is under a specific level, it promotes economic progress, but it impacted negative when it exceeds from the level.

Using cross-sectional and panel regression, Fischer (1993) discovered that inflation lowers the progress by shrinking investment, that eventually reduces productivity growth. He demonstrated that a large increase in price is not mandatory for spectacular achievement, and highlighted that higher inflation is not associated with stable development over time in several exceptional cases. Motley et al. (1994) conducted a study using data from a variety of nations to analyze the influence of inflation on real growth over 30 years. According to their findings, growth will rise about 0.1-0.5% by fall of 5% in inflation. While examining 80 nations from 1961 to 2000, Pollin and Zhu (2006) discovered some interesting findings. They divide the sample into income groups and decades. The variables pattern in OECD economies is not obvious. The inflation coefficient is positive for moderate and low-income economies, but

insignificant for middle-income economies. So, this relationship is significantly connected when grouped by decade.

According to Paul et al. (1997) inflation and economic development have a complex relationship. This research covered 70 nations from 1960 to 1989.They discovered that 40% had a unidirectional association, approximately 20% of nations had bidirectional causation and the remaining 40% of nations had no causal association between inflation and economic development. They also show that countries with lower inflation will transfer genuine growth opportunities away from emerging countries and toward developed economies. The link between inflation and growth is one of the most hotly argued and discussed topics in the history of economic progress. Wai (1959) used data from 1938-1954 to explore the association between inflation and economic progress in developing economies. The research found no link between inflation and economic progress.

Recently, Mukoka (2018) found a no correlation between inflation and Zimbabwe's growth by employing data over the period of 1990 to 2017. Barro (1999) used a neoclassical growth model to analyze the inflation and growth bond for 100 nations employing panel data during 1960-1990 and found that inflation had a strong adverse influence on growth and investment. For the period 1973-2016, Khan and Khan (2018) observe the inflation influence on the rate of economic progress in five Asian economies: Pakistan, Malaysia, Indonesia, Iran, and Bangladesh. They discovered that inflation has a statistically weighty and adverse influence on economic progress in all selected countries.

Currently, price stability considered as essential factor for the achievement of maintainable economic development in most of the states. In these states, price stability remains a primary goal of macroeconomic policies evidenced by (Kryeziu & Durguti, 2019). According to Kasidi and Mwakanemela (2013) the association of inflation and economic progress is one of the macroeconomic challenges that must be addressed to create stable

economic progress. Growth rates and global economic inflation rates are continually changing. Kryeziu and Durguti (2019) claimed that Price stability is a key component in determining an economy's growth rate. As per Ayd (2016) stable macroeconomic structure is a requirement for sustainable economic growth. A stable economic structure depends on price stability which leads sustainable economic growth argued by (Bhattarai, 2018). People begin to doubt the value of money as a medium of exchange because of inflation which leads to reduce savings and subsequently decreased investment and economic expansions.

Sarel (1996) conducted a study by using yearly data of 87 economies during 1970-1990 to examine the nonlinear influence of inflation on economic progress including variables namely: consumer price indices, government expenditures, GDP, terms of trade, investment rates, real exchange rates, and population. The empirical discoveries show that there is a considerable structural split. When the inflation rate reaches 8%, the break is expected to occur. Doyle and Christoffersen (1998) conducted a study from 1990 to 1997 using sample data from 22 transitional states in Central and Eastern Europe and Post-Soviet Union economies, containing Azerbaijan. And they observed that 13% of inflation threshold level exist in selected economies.

Espinoza and Prasad (2010) investigates the inflation threshold influence on GDP growth by taking 165 states including oil exporting economies as a sample from 1960 to 2007. They observed a 10% inflation threshold level for all economies, except for industrialized economies, where the threshold is substantially lower. The threshold impact of inflation on non-oil GDP progress is also assessed because this outcome is less robust for oil exporting economies. The findings suggest that higher than 13% of inflation caused to 2.7% per year reduces real non-oil GDP. Munir et al. (2009) used sample data of Malaysia during 1970-2005 to examine the association between inflation and economic development and they observed 3.89% is inflation threshold level and summarized that beyond the inflation threshold level has

negative impact on economic development while below the inflation threshold level has positive influence.

Jaradat and Al-Hhosban (2014) using Linear Regression Method on sample data from 2000-2010 to investigate the impact of inflation and unemployment on Jordanian GDP. Their results reveal that, Inflation has an optimistic influence on GDP, but unemployment has adverse influence on Jordanian GDP. A study conducted by Li and Liu (2012) using VAR, VEC models and Granger causality test and unit root test on annual time series data for 1978-2010 to examine the controversial association among unemployment rate, inflation rate and economic growth rate in China. They found that all variables have stable equilibrium relationship in long run. In addition, inflation positively influences the economic growth in China.

A study Khan et al. (2001) by using data of 140 industrialized and emerging economies from 1960 to 1998 examines the threshold existence and influence regarding association between inflation and growth. They estimated that the threshold for developing countries would be 7 to 11 percent while the threshold for developed countries would be 1 to 3 percent. They observed that inflation rates below these values have no impact on economic development while inflation rates beyond these values have an adverse influence on economic development.

A study conducted by Vinayagathasan (2013) using dynamic panel threshold model with the sample data of 32 Asian economies during 1980 to 2009 to observe the association between inflation and economic progress and indicated the 5.43% was threshold level for inflation influence on economic progress, observed that inflation rates under this threshold have no impact on economic progress while inflation rates beyond this threshold have a detrimental influence on economic progress. A study carried out on transition economy such as Vietnam by Vui et al. (2015) over the period of 1986-2013 to examine the existence of a threshold influence in the association between inflation and economic progress. They reported that

inflation rates have a detrimental influence on economic progress if the threshold value is above the 7 percent.

Fakhri (2011) conducted a study examining the impact of inflation by exploring the threshold effect. The study utilized yearly data encompassing real GDPs, consumer price index, and real gross fixed capital formation spanning the period of 2001 to 2009. The findings demonstrated that the relationship between economic growth and inflation is nonlinear. The study revealed a specific threshold for inflation at 13%, where inflation rates below this threshold were found to have a noteworthy positive impact on GDP. However, once the inflation level surpassed 13%, the effect became detrimental, resulting in a negative impact on GDP. In a study conducted by Espinoza et al. (2010) the impact of inflation on economic growth was investigated using panel smooth transition regression across 165 countries. The findings of the study identified a threshold inflation level of 10% for developing countries and 13% for oil-exporting countries. These results indicated that there is a nonlinear relationship between inflation and economic growth in these contexts.

In a similar vein, Bawa and Abdullahi (2012) conducted a study in Nigeria to examine the impact of inflation on economic growth. They utilized quarterly time series data from 1981 to 2009 and employed a threshold regression model. The results of their analysis revealed a specific inflation threshold level of 13%. Below this threshold, the influence of inflation on economic activities was relatively minor. However, once inflation exceeded this threshold, the negative impact on growth became significant and prominent.

Karahan and Çolak (2020) conducted a study in Turkey to examine the connection between inflation and economic growth. They employed the Nonlinear Autoregressive Distributed Lag (NARDL) model and analyzed quarterly data spanning from 2003 to 2017. The study revealed a negative relationship between inflation and economic growth. Similarly, NGOC (2020) investigated the asymmetric impact of inflation and money supply on economic

growth in Vietnam. Using the Nonlinear Autoregressive Distributed Lag approach, the study examined data from 1990 to 2017. The findings confirmed the negative influence of inflation on economic growth and emphasized its asymmetric nature in the long run.

A study conducted by Bawa and Abdullahi (2012) used a threshold regression model on the time-stamped data of Nigeria during 1981-2009 and found that there is 13% inflation threshold. Inflation was shown to have a minor impact on economic actions below the threshold level, while above it, the extent of inflation's negative influence on growth was found to be large. Similarly, Hasanov and Hasanli (2011) investigated the influence of inflation on economic progress in Azerbaijan during 2000 to 2009 and found a figure of 13% as the inflation threshold. He discovered that an inflation rate under this level has a favorable impact on economic development, while one beyond the threshold has a negative one. A study conducted by Akgül and Özdemir (2014) using two-regime TAR model on the sample data of Turkey over the period 2003-2009 to analyze the nonlinear association between inflation rate and economic development. They discovered that the inflation threshold was 1.26 during analysis period. Inflation rates above the threshold had a detrimental impact on economic progress, whilst inflation rates had a beneficial impact under the threshold.

A study conducted by Kremer et al. (2013) using data from 124 industrialized and non-industrialized nations from 1950-2004 to analyze the influence of inflation thresholds on long-term economic development. They anticipated that the inflation threshold for industrialized countries would be 2% and for non-industrialized countries would be 17%. Moreover, inflation rates exceeding the threshold has a detrimental influence on economic growth, under the threshold inflation rates has little impact. These findings in line with the theory that inflation helps underdeveloped countries growth. Another study conducted by Mubarik and Riazuddin (2005) using threshold analysis to investigate the association between inflation and economic progress in the Pakistani economy during 1973-2000. The results of the investigation revealed

that an inflation rate of more than 9% threshold had a detrimental impact on economic progress. Munir et al. (2009) used an endogenic threshold autoregressive (TAR) model to analyze the link concerning inflation and economic growth in the Malaysian economy during1970-2005. They found that threshold to be 3.89% and inflation rates beyond the threshold had a detrimental impact on economic progress but below this threshold inflation rates has a favorable impact.

Fabayo and Ajilore (2006) use Nigerian data from 1970-2003 to test the threshold existence and impact on the inflation and growth association, The findings show that there is 6% inflation threshold. Inflation and economic growth have a considerable beneficial association below this threshold level, but inflation harms growth performance above this level. A study carried by Frimpong and Oteng-Abayie (2010) using threshold regression models on sample data of Ghana over the period 1960-2008 to analyze the impact of inflation threshold on economic progress. They found that inflation threshold of 11%, below the threshold level inflation little influences the economic doings but negatively influences when inflation exceeding from threshold level.

A study conducted by Sargsyan et al. (2005) using Armenian data from 2000-2008 to analyze the threshold level of inflation and concluded that targeting an inflation level higher than the percent but not surpassing the 4.5 percent threshold value which is favorable for Armenian progress. Another study conducted by Kremer et al. (2009) using data panel of 63 advanced and non-advanced economies to examine the impact of inflation for sustainable economic development. Their discoveries demonstrate that inflation more than threshold of 2% for industrial and 12% for nonindustrial countries is harmful for growth while below these thresholds' inflation significantly positive to economic growth.

A study Ozturk and Karagoz (2012) investigated the association between inflation and economic growth in Turkey using data from the years 1987–2006. Data were analyzed by

Bound Test to examine that whether a long-term relationship exist in between both variables or not. The test result indicated the presence of a cointegration association between the two series. With the developed ARDL models, no statistically significant long-term link was discovered; nevertheless, a short-term, negative relationship was discovered. The framework of the established causality test was used to investigate the causal relationship between the two series. There was an absence of a correlation between economic growth and inflation, but a correlation was observed between inflation and economic growth.

Through the use of co-integration and error correction models, Ahmed and Mortaza (2005) investigated the relationship between inflation and economic growth in Bangladesh by analyzing annual datasets of real GDP and CPI from 1980 to 2005. The findings revealed a statistically significant long-term negative association between CPI and real GDP, providing empirical evidence of a significant negative relationship between inflation and economic growth in the country. Furthermore, the study identified a structural breakpoint in the link between inflation and economic growth. It was discovered that this breakpoint occurred at an inflation rate of approximately 2%, and below this threshold, the relationship tended to be strong and positive. However, above this threshold, inflation had a detrimental impact on economic growth.

Denbel et al. (2016) conducted a research study in Ethiopia to investigate the interplay between inflation, money supply, and economic development. They utilized co-integration, causality analysis, and the Johansen co-integration test. The results revealed that Ethiopian inflation is primarily influenced by economic development, having a negative impact on it. Therefore, it appears that economic growth has a stronger influence on inflation rather than the other way around. Another study of Runganga (2020) investigated the presence of a threshold level and the connection between inflation and economic development in Zimbabwe. The study used yearly data from 1981 to 2018 and employed the Dynamic Ordinary Least Squares

(DOLS) approach. The findings indicated that inflation negatively affects economic growth and the proportion of the population.

Madurapperuma (2016) assessed the influence of inflation on economic growth in Sri Lanka from 1988 to 2015, employing the Johansen co-integration framework and the Error Correction model. The study demonstrated a long-term negative and significant association between the two factors. The results suggest that increasing inflation has a detrimental impact on Sri Lanka's long-term economic growth. Managing inflation becomes crucial for the country to achieve sustained economic growth, emphasizing the importance of keeping inflation within single digits. Al-Taeshi (2016) utilized data from the St Louis Federal Reserve Bank to explore the influence of inflation on Malaysian economic development.

Adaramola and Dada (2020) examined the link between inflation and output growth in Nigeria using the ARDL model, considering various macroeconomic variables. Their findings indicated a negative relationship between inflation and economic growth, while variables like money supply exhibited a positive relationship. The study also revealed a one-way relationship between public consumption expenditures and GDP, with no established connection between inflation and GDP. It was recommended to implement policies that maintain low inflation to avoid its negative effects and ensure sustained economic growth.

A study conducted by Chindengwike (2023) using time series data spanning from 1970 to 2021, the relationship between inflation and economic growth in Sub-Saharan African countries was analyzed. The study employed the Vector Error Correction Model (VECM) and Granger Causality techniques, focusing on the consumer price index as the variable of interest. The findings revealed a statistically significant and negative long-term association between inflation and economic growth. However, in the short run, the two variables were positively related.

A study conducted in Mogadishu by Malin (2016) who focusing on the relationship between inflation and its effects on households. The research aimed to investigate how inflation affects purchasing power and household livelihood, analyze the impact of market commodity prices on households, and understand how economic conditions influence households. The findings revealed that Mogadishu, Somalia, experiences high inflation, and a significant association between inflation and households was observed. Despite the inflationary environment, the majority of individuals expressed satisfaction with their economic situation, highlighting the complex role of inflation in economic growth and the availability of goods and services.

The relationship between Inflation and economic growth in Bangladesh, India, Pakistan, and Sri Lanka were studied to determine their short- and long-term dynamics. They used co-integration and error correction models to analyze the annual data that was obtained from the International Financial Statistics (IFS), International Monetary Fund (IMF). Firstly, a positive and statistically significant correlation exists between inflation and economic growth across all four countries. Inflation is more sensitive to shifts in growth than growth is to inflation. Inflation is more sensitive to shifts in growth than growth is to inflation. These findings have significant policy consequences since they show that higher economic growth feeds into inflation, leading to overheating. Inflation and economic growth are at a crossroads in these four nations (Yousef, 2020).

Governments are now implementing policies under the main concept of sustainable development to achieve broad economic goals including price stability, high employment, and sustainable ongoing economic growth. These initiatives consist of monetary and fiscal policies, financial institution regulation, trade, and tax policies. However, despite their best efforts, national central banks have not been very successful in controlling inflation, with the exception of the Federal Reserve and the European Central Bank. Furthermore, they still have a limited

grasp of the factors that cause inflation (Dornbusch et al., 1998). Although sentiments toward inflation have changed over time, the monetary method has predominated. The understanding of inflation has also benefited from the Keynesian perspective and theories of economic regulations. A recent analysis of the impact of economic policies was done by Hoehn et al. (2021).

These authors linked the effectiveness of the monetary policy's stock market channel to the emergence of bubbles by providing evidence regarding the stock market's reaction to monetary policy shocks. However, they constrained the analysis to the direction of monetary policy surprises and the state of the economy because both sign- and state-dependent responses are stylized facts reported by earlier researchers. The findings allowed authors to draw conclusions about the effectiveness of monetary policy in the pertinent situation—one in which stock market bubbles develop during an expansive phase of the business cycle—and provided evidence that monetary policy cannot effectively prevent the expansion of stock market bubbles. These authors noted that, aside from during expansionary periods, the effects of positive monetary shocks on stock market returns are not thought to be particularly substantial. The relationship between these findings and the emergence of stock price bubbles was supported by the fact that the contractionary monetary policy's ineffectiveness un transmitting information is now specifically placed in the stage of the business cycle where these bubbles grow.

On the other hand, throughout expansionary eras, the impact of negative monetary policy shocks on stock market returns remained negative and large. The result was that during expansionary periods, negative monetary policy shocks helped to fuel bubble inflation whereas positive monetary policy shocks had no effect. Short-term interest rates were hypothesized to be at the center of the creation of the stock market bubble due to the asymmetrical behavior of the stock market channel of monetary policy transmission. Finally, Hoehn et al. (2021) shown

that macroprudential monetary policy tools are better suited to handle stock market bubbles than 'traditional' monetary policy measures.

One of the most crucial measures of a nation's economic health, inflation addresses the macroeconomic sustainability of the economy. A long-term increase in the average price level of goods and services that results in a decline in the buying power of a unit of currency is an indication of how well the economy is doing overall. It is sometimes compared by economists to temperature, which can be a sign of certain illnesses. The causes of inflation are numerous economic elements, just like the causes of temperature. The rate of inflation serves as the standard indicator of inflation. It is the general price index's annual percentage change, which is often the consumer price index (CPI). A statistically weighted assessment of the costs of a certain set of products and services is the consumer price index (CPI) (Girdzijauskas et al., 2022).

Sweidan (2004) used data of Jordan's economy from 1970-2003 in order to determine the nature of the relationship that occurring between inflation and economic progress. The findings revealed that inflation is positively correlated with economic growth, but he demonstrates a breakpoint of 2%, beyond which the association between the inflation and economic progress was observed to be adverse. Hussain and Malik (2011) used a time-stamped data set for Pakistan during 1973–2005 to examine the inflation threshold level. He found that inflation threshold level is ranging from 4–6% and anything beyond this threshold causes harm to economic growth.

In the example of Ghana, Marbuah (2010) used data set from 1955-2009 to examine the relationship between inflation threshold and economic progress and observed that inflation threshold significantly impacted the economic progress, both with and without a structural break. The research revealed that the 6% for lowest and 10% for highest inflation threshold in Ghana. Karki et al. (2020) study findings are in the favor of the specific inflation threshold

level which is appropriate for development of Nepal. In order to ensure sustainable economic growth, each country's inflation thresholds must be determined. Low inflation, according to (Arby & Ali, 2017; Omarova, 2020a), is one of the indications of macroeconomic stability and related to the established economy (Gylfason & Herbertsson, 2001). Another study conducted by Lubbock et al. (2022) using Unit Root Test and Johansen Cointegration Test sample data of Philippine for the period of 1991-2020 to examine the impacts of inflation, population growth and unemployment, on economic growth. They found that inflation positively influences the economic growth.

A study conducted by Kryeziu and Durguti (2019) using a multiple linear regression model and least squares regression on the panel data of Eurozone countries during 1997-2017 to analyze the impact of inflation rate on the growth rate or to GDP growth. They reported that inflation rate favorably influences economic growth rate for Eurozone. Mallik and Chowdhury (2001) investigated the inflation impact on economic progress for 4 South Asian economies (Pakistan, India, Sri Lanka, and Bangladesh) and found that inflation is positively correlated with economic progress in addition, inflation being more encourage the change in rate of growth than growth to fluctuations in rate of inflation. Similarly, Osuala et al. (2013) using cointegration analysis to investigate the inflation influence on economic development in Nigeria during 1980-2010. They reported that inflation and economic growth has statistically significant and positive relationship.

According to academics, inflation affects the economy both negatively and favorably. Future investments and savings may be discouraged by inflation. If inflation is severe enough, there might be a shortage of products because people would begin to stockpile them out of concern that they would become more expensive in the future. Additionally, it has been shown that moderate inflation boosts growth and lowers unemployment. However, there are some

contemporary views that claim the opposite is true because an economic rebound speeds up inflation. Later evidence will support this claim (Girdzijauskas et al., 2022).

Although inflation must be controlled for a geographical entity, the degree of inflation required to support economic growth is the most significant consideration for policymakers and specialists. Several studies have conducted by using non-linear econometrics to investigate inflation. The determination from these studies is that the inflation threshold required to promote economic growth varies depending on the nations, the empirical methods and the analysis' period used.

2.5.2 Current Account Balance and Sustainable Development:

The current account balance records the imports and exports of goods and services, primary and secondary investment incomes, also unrequited transfers and employee's compensation which measures typically in local currency. The current account balance reflects a performance of country in terms of goods and services trade, which can be surplus or deficit. A surplus condition demonstrate that a country's exports are greater than imports whereas a deficit condition demonstrate that a country's imports from other countries exceed its exports. Current account balance also known as savings-investment gap which is equal to national savings minus investment (Sanni et al., 2019).

United States of America logging a consistent current account deficit whereas China notes a constant surplus of current account, recently because of rising global imbalances current account balance and its impact on economic development have been at the center of discussion amongst policymakers. The current account particularly in the developing countries plays integral part in sustainable economic growth because of trade importance which is the main basis of foreign exchange earnings. Over the years, developing economies' dependency on trade has been growing because of the increase in trade openness, the global paradigm shifts to

trade, advancement in information and communication technology, the increase in commodity prices and developing countries' role increasing in the global economy (Moussa et al., 2016).

Also, Fischer (1988) considers the current account deficit to be an indices of impending crisis, claiming that if the expected current account deficit is huge, or if a country with foreign borrowing does not have enough current account surplus, then the country is vulnerable to devaluation (crisis). In their empirical research, Milesi-Ferretti and Razin (1996) argue that a certain current account deficit threshold is an insufficient informative indication for sustainability. They propose that other structural macroeconomic issues should be considered when assessing the current account deficit's sustainability.

Similarly, Edwards (2002) noted that the current account balance is in constant interplay with macroeconomic variables and that determining a sustainable threshold might be difficult and deceptive. In this regard, when previous experiences are taken into consideration, it is obvious that a country with a current account deficit does not inevitably experience a crisis. Though, depending on the deficit size, the current account deficit is seen as a critical trigger of economic crises for countries that have difficulty in financing their current account deficits or do not choose strong or reliable financial sources even if they can finance their current account deficits (Erdoğan & Bozkurt, 2009). Some economists believe that the current account deficit plays a significant role in the crises that have occurred (Corsetti et al., 1999; Radelet & Sachs, 2000). As per Edwards (2005) current account deficit to be an indicator of impending economic crisis and considered that a constant large-scale current account deficit is a noteworthy economic issue which could lead to greater issues if required precautions are not taken.

Granger causality and VAR analysis utilized by Yurdakul and Ucar (2015) to investigate the Turkey's current account deficit relationship with economic development. Economic growth caused a rise in the current account deficit, showing an inverse association between economic progress and balance of payments, as per the research. Granger causality

method shows that growth rate has unidirectional correlation with current account deficit. In addition, the impulse response functions produced by VAR analysis revealed that the current account has negative reaction to a one-standard-deviation shock to the growth rate variable which stayed for 10 period.

Sanni et al. (2019) using Auto Regressive Distributed Lag Bounds method on Nigerian annual data over the period of 1970-2016 to examine the current account balance connection with economic growth. Their finding shows that current account balance has relationship with real gross domestic product (GDP) growth in long run for Nigeria. Due to real GDP growth and the current account balance have a positive connection, a rise in real GDP growth will result in a better current account balance. Aydın et al. (2016) used threshold autoregressive (TAR) models on the data set from 1999-2014 in Turkey to examine the effect of existing threshold of current account deficits on economic growth. According to the findings of the analysis, the projected deficit threshold is 4% for economic growth, and any current account deficit ratio above this threshold negatively influences the economic growth, whereas any rate less than this threshold has a favorable impact. Mugo et al. (2021) used dynamic VEC model, unit root tests and cointegration analysis on annual time-stamped data during 1980-2016 to investigate the influence of current account deficits on economic progress of Kenya. They observed that current account deficits significantly and positively influence the economic growth.

Researchers found a causal association between economic progress and current account deficit in various studies published in the literature (Destek & Sinha, 2020; Yurdakul & Ucar, 2015). Using VECM models for the US economy Kandil and Greene (2002) discovered a causal association between economic growth and current account deficit. Rising GDP negatively influences the current account deficits in transition nations. Few studies have found

a link between the current account deficit and economic growth (Dornbusch & Fischer, 1993; Malik et al., 2010).

Larissa et al. (2020) examined Pakistan's economy using typical Granger causality tests. Aside from the foregoing, several research has discovered a shaky link between economic growth and the current account deficit. Using panel data, Akbar (2014) investigated the economic growth association with current account deficits, and capital flows for short time in emerging market nations. They discovered a bidirectional causative relationship concerning economic development and current account deficit, as well as a unidirectional causal association between short-term capital flows and current account deficit and GDP. In addition, study findings revealed an association between the current account deficit and GDP in developing markets. In line with this Bagnai and Manzocchi (1999) used a panel-data regression technique on 49 developing nations1971-1993 and found current account deficits has an inverse link with a set of macroeconomic factors.

2.5.3 Exchange rate and sustainable development

According to Shaik and Gona (2021) the value of local currency in relation to foreign currency is described as the exchange rate. According to Osiegbu and Onuorah (2011), the exchange rate plays an integral part in the transactions of international trade, as no country can stay isolated because of fluctuating factors of endowment. Guzman et al. (2018) observed that an effective, competitive, and multiple exchange rate boosts the economic progress. So, the flexible and sustained interventions in exchange rate are required because of global financial markets instability.

Senadza and Diaba (2017) observed the exchange rate volatility has positive effect in long-run and negative in short-run for 11 Sub-Saharan African countries. found that volatility has negative and significant effect on exports for Morocco, Malawi, and South Africa. Arize et al. (2000) conducted a study on underdeveloped economies and found that export flows have

a statistically significant and negative correlation with exchange-rate volatility. A study conducted by Schnabl (2008) ,observed that exchange rate stability positively contributed to the economic growth because it leads capital inflows and more trade. Aguirre and Calderón (2005) observed that misalignment of real exchange rate impacted negatively on economic development for 16 economies. A study conducted by Eichengreen (2008), he found that stability and average real exchange rate is critical for development. A cross-country analysis conducted by Nouira and Sekkat (2012) they reported that undervaluation did not have a positive impact on growth.

Vieira et al. (2013) observed that stable exchange rate boost faster economic growth as compared to the misaligned exchange rate. Janus and Riera-Crichton (2015a) highlighted that there is negative relationship exist between real effective exchange rate instability and economic growth. J. Adeniran et al. (2014) reported that instable exchange rate impacted negative on economic progress. Petreski (2010) stated that a moderate fluctuation in exchange rate positively contributed to economic growth. Also, Babu et al. (2019) reported that there is an optimistic impact of moderate exchange rate fluctuation on economic growth. Alagidede and Ibrahim (2017) found that overvaluation of exchange rate appreciation damaged the path of economic development. So, normally the real exchange rate has favorable association with economic growth in developing states.

A study conducted by Anietie et al. (2004) to investigate the effect of effective real exchange rate on economic activities in Nepal by engaging co-integration and error correction methods. They examined which of the transmission channels such as total demand and total supply, had the greatest impact on real exchange rates. As per the outdated view, the aggregated demand influences the real exchange rate. It indicates that the real exchange rate's depreciation improves the international competitiveness of local commodities and increases net exports, which leads to a boost in GDP. Hacker and Hatemi-J (2004) GDP function technique, which

allows enough functional form flexibility to estimate demand of imports and supply of exports elasticity in 117 economies. In the post-Bretton Woods period, Antonia and Bara (2008) conducted a study to investigate the association between real effective exchange rate and cumulative real trade balance for main OECD economies by employing parametric and nonparametric techniques. Their results show that exchange rate considerably influences the trade balance.

Following the Bretton Woods system's collapse, the influence of exchange rate instability on economic progress has gained a lot of consideration. The significance of exchange rate dynamics is improbable to fade in the current situation of financial deregulation, regional integration, and crises. Furthermore, the capability to compete successfully in the global economy is becoming increasingly connected to national economic prosperity. So, in the global economy, national governments still have a major concern about exchange rate volatility. This is especially significant for developing economies due to their instable financial systems and higher vulnerability to shocks from the outside (Aghion & Howitt, 2006). A considerable amount of research demonstrates that the real exchange rate and growth of GDP are linked. Economies have an incentive to keep the comparative price of traded products high enough to make it desirable to move resources towards their manufacture plants if productivity is larger in the sector of traded products. In the sector of traded goods, there are learning by performing influences that are outside to the particular company, so a fragile real exchange rate is required to stimulate the creation of tradable goods (Benigno et al., 2016).

Thus, undervaluation of the exchange rate operates as a support to the well-organized trading sector in these scenarios. In developing countries, institutional flaws and market failures such as knowledge spillovers and credit market faults are compensated for by a weak real exchange rate, resulting in underinvestment in the sector of traded goods (Rodrik & Subramanian, 2009). Using Bertrand competition model in their study Di Nino et al. (2011),

found that nominal depreciation has lasting real impacts on production growth and growing returns to scale. A fragile exchange rate encourages people to save and invest more by income redistribution and lowering labor costs. Real devaluation increases savings and investment by moving resources from consumers to financially strapped businesses.

According to Minescu (2012), as real exchange rate directly influences the exports prices therefore it is critical for the economy. The economic growth influenced by real exchange rate because of export-oriented production's growth and export-led growth notion. Alongside, from 1971 to 2009, Kogid et al. (2012) investigated the influence of currency rates on Malaysian economic progress. The outcomes show that the exchange rate significantly influences the economic development not just in the short-run, but also in the long-run. Moreover, Lee and Law (2013) used the ARDL test to examine the influence of exchange receptiveness on the exchange rate in Malaysia. Their findings indicate that an increase in exchange receptivity and finance costs will lead to a depreciation of the Malaysian Ringgit. Consequently, their results indicate that a change increase in the money supply will increase the Malaysian Ringgit. Though, an increase in the exchange balance tend to lead Malaysian Ringgit's depreciation.

In Turkey, a study was carried out by Kandil et al. (2007) with the aim of investigating how changes in exchange rates impact real output, price levels, and the actual value of different components of aggregate demand. The findings revealed that expected exchange rate appreciation had significant adverse consequences, leading to a decrease in real production growth, investment, and export demand, as well as an increase in price inflation. Additionally, the study highlighted that unexpected exchange rate fluctuations had asymmetric impacts, with unanticipated depreciation limiting production growth, private consumption, and investment development.

Another study of Ozata (2020) the focus was on Turkey's economic development and how it is affected by fluctuations in exchange rates. The study analyzed data from 1998:Q1 to 2019:Q3 and employed an Autoregressive Distributed Lag (ARDL) model to examine the relationship. The findings of the ARDL model estimation demonstrated that higher volatility in the real effective exchange rate had a detrimental and statistically significant effect on Turkey's economic development. Furthermore, the long-term coefficients indicated that both exports and investments positively and significantly influenced real GDP, while imports and exchange rate volatility had a significant negative impact.

In a comparative analysis conducted by Kandil and Nergiz Dincer (2008) the effects of exchange rate fluctuations on real output, price levels, and aggregate demand components were examined in both Egypt and Turkey. The results of the study revealed that in Turkey, the anticipated appreciation of the exchange rate had significant adverse effects. These effects included a decline in real production growth, investment, and export demand, while simultaneously leading to an increase in price inflation. In Egypt, the expected exchange rate rises hindered export growth. Furthermore, the study revealed that random variations in exchange rates in both countries had asymmetric impacts. In Turkey, the unexpected devaluation of the exchange rate had negative impacts on production growth, as well as the growth of private consumption and investment. On the other hand, in Egypt, the unforeseen fluctuations in the exchange rate had a mixed effect. It resulted in a reduction in real production and consumption growth, but it also led to an increase in export growth, highlighting the asymmetry in the overall impact.

In Somalia, a study of Isse and Ibrahim (2017) who observed that the exchange rate is influenced by various factors. According to a study, there is a significant negative relationship between the exchange rate and factors such as the trade balance, money supply, and foreign debt. In contrast, the absence of a strong central government has been identified as a significant

positive factor linked to the exchange rate. The lack of government since 1991 has resulted in an improved exchange rate in Somalia. The study suggests that the central bank of Somalia should implement measures to enhance political circumstances, which would contribute to boosting the worth of the Somali shilling.

In Pakistan, a study of Aman et al. (2017) investigated the relationship between the exchange rate and economic development using a simultaneous equation model and two-stage least squares (2SLS) and three-stage least squares (3SLS) approaches. The findings indicated that the exchange rate positively influences economic growth through export promotion incentives, increased investment volume, boosted foreign direct investment (FDI) inflow, and support for import substitution industries. However, the study also emphasized that the exchange rate should not be solely relied upon as a policy tool.

A study conducted by Manalo et al. (2015) investigated how changes in the exchange rate affect Australia's output. The results obtained from multiple models revealed that a temporary 10% devaluation of the exchange rate could boost GDP levels by around 14-12% within a span of one to two years. Moreover, a permanent 10% real depreciation was found to contribute to an approximate 1% increase in GDP after two to three years. The findings from various models indicated that a temporary 10% depreciation of the exchange rate can increase the level of GDP by 14-12% over one to two years, while a permanent 10% real depreciation can lead to an approximately 1% increase in GDP after two to three years.

A study created a new database by Frankel et al. (2019) to analyze the de facto Exchange Rate Regime (ERR) for 145 countries and explored the variations in ERRs over time and their association with economic growth. The study revealed that intermediate ERRs were positively associated with economic growth, with the relationship varying by income level. In low-income countries, the choice of Exchange Rate Regime (ERR) was determined to be more significant compared to high-income nations. To investigate the impact of exchange rate

fluctuations on Nigeria's economic growth, Okorontah and Odoemena (2016) conducted a study utilizing annual data spanning from 1986 to 2012. The research employed various methods including Ordinary Least Squares (OLS), Johansen co-integration test, and the error correction technique (ECM). However, the findings indicated that there was no significant relationship between the exchange rate and Nigeria's economic performance.

In another study conducted by Victor et al. (2019) which specifically focused on Nigeria, the effects of exchange rate variations on different economic sectors were analyzed. The research discovered that the exchange rate did not have a substantial influence on the agriculture (AGDP), manufacturing (MGDP), or service (SGDP) sectors. However, it did have a positive and significant impact on the petroleum (PGDP) sector. The study emphasized the need to diversify Nigeria's economy to boost non-oil sectors and generate significant foreign income. Research conducted on Central and Eastern European nations by Morina et al. (2020) with the aim of investigating how fluctuations in the real effective exchange rate volatility affect economic development.

The study analyzed yearly data from 2002 to 2018 for fourteen countries in the region. The empirical results of the study indicated that exchange rate volatility had a significant detrimental effect on real economic growth. Additional measurements of exchange rate volatility, such as standard deviation and z-score, further supported these findings. The study recommended implementing measures to maintain exchange rate stability to support economic growth. Nevertheless, several researchers have come to differing results.

The research findings of Fung (2008) revealed that real currency appreciation increased the scale of surviving firms, resulting in a clear scale impact, enhancing productivity, and encouraging economic development (Zhao et al., 2014) discovered that the total influence of real exchange rate appreciation leads to the modification of economic growth patterns at both the Chinese and regional levels in his research. According to Karahan (2020) that local

currency devaluation converts both imports demand to the local products and foreigners demands into the country. Consequently, increase in exchange rates encourages the net exports that eventually trigger economic growth. It indicates that devaluation considered as an effective policy tool that can be utilized to speed up economic growth. A study conducted by Narayan and Singh (2007) examine the impact of devaluation on Fiji economy by using co-integration method on the data over the period of 1970 and 2000. They reveal that devaluation in both short and long run expanding the productivity i.e., 10% increase in devaluation causes the 3.3% rise in productivity.

A study Tarawalie (2010) focused the real exchange rate association with economic growth by using the Johansen cointegration technique on the data of Sierra Leone from 19990Q1 to 2006Q4. Their findings show that real exchange rate positively stimulates output growth, Particularly, in Sierra Leone, the depreciation of the real exchange rate boosts the economic development. A study Chen (2012) using dynamic panel data estimation on 28 provinces data set from the period of 1992-2008 investigated the exchange rate role in economic development and growth rates' convergence in Chinese provinces. He discovered that the rise in real exchange rate positively influences the economy of provinces.

Another study Aman et al. (2013) using three stage least square techniques on sample data set of Pakistan over the period of 1976-2010 focused the exchange rate's association with economic growth. They reveal that exchange rate positively stimulates economic growth by encouraging the substitute industry of export and import. Obansa et al. (2013) conducted a study to analyze the exchange rate impact on economic development for the Nigeria from 1970 to 2010 by using vector auto- regression (VAR) technique, they observed that exchange rate substantially and optimistically influences the economic development. So, they reveal that real exchange rate depreciation significantly associated with economic growth.

A study Missio et al. (2015) employing a large sample of 63 developing economies during 1978-2007 to empirically examine the association between real exchange rate and output growth rate. Their findings show that economic growth positively influenced by the sustaining a competitive level of real exchange rate. It means that currency depreciation may affects the economic sustainable development by boosting the income elasticity of exports demand. A study Habib et al. (2017) utilizing the 5-year average data for 150 economies to examine the impact of real exchange rate fluctuations on economic development in the post-Bretton Woods years. They discovered that a real GDP growth annually increased because of real depreciation. So, the findings demonstrated the huge impact of devaluation on developing countries' economic growth.

Damill et al. (2016) observed that real exchange rate (Feyrer) undervaluation was positively correlated with economic growth. Morina et al. (2020) used fixed effect model to analyze the influence of real exchange rate instability towards economic development. They found that lower level of exchange rate volatility contributed to the economic development in Central and Eastern European economies. Barguellil et al. (2018) explore the linkage regarding exchange rate volatility and economic progress using sample data of 45 emerging and developing economies from 1985-2015 and data were analyzed by GMM estimator. They observed that exchange rate volatility negatively influences the economic growth. Some studies found mixed findings regarding linkage between exchange rate variation and economic development for OECD economies.

Riera-Crichton et al. (2015) observed that exchange rate fluctuation has inverse connection with the GDP. Kong (2021) explore the nonlinear impact of the exchange rate on economic progress using the PSTR model on sample panel data of 35 OECD economies from 2001–2019. The findings indicate that exchange rate appreciation helps to boost economic development. Exchange rate appreciation supports economic growth more effectively when the

local currency's value is high, while exchange rate appreciation less effectively promotes economic growth when the local currency's value is low.

The majority of empirical evidence tends to validate an optimistic relationship between weak real exchange rates and growth, and it indicates that overvaluation hurts economic growth, whereas Aguirre-Güitrón et al. (2019) found that large under and over valuation damage growth, but mild undervaluation benefits growth. Likewise, Hausmann et al. (2005) show that strong economic accelerations are frequently connected with depreciations of the real exchange rate. According to Rodrik (2008), development acceleration occurs after ten years of consistently rising undervaluation in emerging economies.

Di Nino et al. (2011), using panel dataset of Italy from 1861–2011 observed that undervaluation has positive relationship with economic growth. Moreover, they found that undervaluation boosts growth in Italy because of high-productivity sectors and increase in exports. Kappler et al. (2013) using sample of 128 developing and developed economies from 1960-2008 to examine the 25 instances of substantial nominal and real appreciations. The effects on output are found to be limited. The results are statistically insignificant and its negative impact on output is only about 1% after six years.

Kappler et al. (2013) by using VAR model with sign restrictions observed that pure real exchange rate shocks those unaffected by monetary policy have a significant simultaneous influence on output at a business cycle frequency. Lastly, Glüzmann et al. (2012) found that undervaluation increased local savings and investment and employment, in emerging countries but no effect on the tradable sector.

2.5.4 Unemployment and sustainable development

According to the Englama (2001) the number of economically productive persons who are jobless simply capable for and actively searching for job, containing those who have lost

their professions and who have willingly quit their works is called unemployment. Ademola and Badiru (2016), defined unemployment as the considerable portion of people who are without jobs in a state usually expressed as a proportion of the work force. Unemployment expressed in other words, headcounts who are wanting and competent to work and those who prepare themselves for work at the predominating wage rate, but who are unable to find job.

Unemployment considered as a most important element to understand the micro & macro economies and formulating strategic schemes for stabilizing countries and promoting economic development in most countries. Unemployment is recognized as one of the most critical issues that any human civilization can confront, as it has consequences in various magnitudes and directions (Ademola & Badiru, 2016). In most economies, the impact of unemployment on GDP (gross domestic product) has long been a topic of discussion (Quy, 2016).

Currently, developed, developing and underdeveloped countries confronting the most pressing macroeconomic issues such as alleviates unemployment rate and boosts economic development of any country. Economic growth and unemployment are the indicators of the robustness of every strong country, which reveals the nation's ability to fully utilize its labor resources. Several studies have shown contradictory findings regarding association between unemployment and economic growth rate. So, these contradictory findings of such studies are herder to generalize and supports in forecasting on other nations (Akutson et al., 2020) .

Being scientific theory Okun's Law that claims that productivity and unemployment are linked. This is one of the most recognized macroeconomic associations, and it has been proven to be true for a wide range of economies, continents, and particularly emerging economies (Christopoulos, 2004; Daniels & Ejara, 2009; Farsio & Quade, 2003). Okun’s law explains two crucial empirical associations concerning with unemployment rate and economic growth rate. The first is that periodical variations in the unemployment rate are connected to periodical

variations in the economic growth rate, and the second is that nonconformities in the unemployment rate are also associated with nonconformities in the economic growth rate from their peak point (Akutson et al., 2020).

Economic growth, being a crucial macroeconomic indicator, has been recognized as a critical component that can support to resolution of the threat of unemployment by minimizing unemployment (Al-Habees & Rumman, 2012). The greater economic growth rates significantly contributed to national development not just unemployment they play an integral part in every field of economic progress. It is a method of addressing unemployment concerns that aids in the reduction of poverty in a country. Economic growth provides a platform for new entrepreneurs to emerge, and it acts as a means of absorbing unemployment through job creation.

According to Tanha (2018), economic stability can be attained by lowering the unemployment and inflation rate, as well as implementing sound macroeconomic policies. Employment is considered as fundamental factor that drives economic growth (M. A. Nawaz et al., 2019). Between 1980-2004, studied the Okun's Law throughout the Spanish regions. Their results indicate that unemployment has a reverse connection with economic progress in most of the areas and about the world. So, they theorized that efficiency varies by regions. Zagler et al. (2006) reported that unemployment and economic development have significantly negative association for the U.K countries by using fixed-effect regression techniques.

A study conducted by Michael et al. (2016), employed the VECM, the cointegration test, and the Granger causality method on the sample of Nigeria for the period of 1980-2013 to examine the association between sustainable growth and unemployment. Their findings indicate that unemployment negatively influences the GDP while there is also unidirectional association exist between both and causality run from economic development to unemployment

Pierdzioch et al. (2010) used the sample data of G7 countries for the period of 1989-2007 to investigates association between economic development and unemployment. The study outcomes sustained the Okun's law and professional economists' forecasts regarding fluctuations in unemployment rate and real output progress rate. In addition, they discovered that there is direct association between extent of unemployment and output gap size. A study conducted by Wang and Abrams (2007) focusing on the 20 OECD nations from 1970-1999 and found similar result that a negative connection exists between economic growth and unemployment.

Lal et al. (2010) confirms that Okun's law is valid in some Asian economies over the period of 1980-2006 by employing time series annual data. The cointegration technique of Engle and Granger (1987) established a connection between the variables in long-run. For evaluating causality and co-integration between variables they were used the VAR and VEC techniques to analyze the connection amongst unemployment, economic growth, and inflation in China. Li and Liu (2012) found that unemployment negatively influenced the growth while inflation impacted favorable.

A study Hlongwane and Daw (2021) using Autoregressive Distributed Lag Model, Error Correction Model on sample data set of South Africa during 1980-2020 to examine the nexus between unemployment and economic development. The finding shows that unemployment statistically insignificant and negatively influences economic progress in South Africa. In addition, there is no causality concerning unemployment rate and economic progress as per the results of Granger causality tests.

A study conducted by Dritsakis and Stamatiou (2017) use panel estimation methods on the data set of new European members over the period of 1995-2013 to examine the relationship among unemployment, foreign direct investment, exports, and economic development. They found that there is negative link between unemployment and economic progress. So, they

suggested that these sampled countries governments need to reduce unemployment by increasing exports, stabilizing exchange rate which eventually stimulates economic growth.

Another study Bui (2021) using panel VAR model and Granger causality test on the old European Union members over the period of 1970-2015 to examine the association among unemployment, foreign direct investment, exports, and economic growth. They found that unemployment has detrimental effect on economic development moreover they suggested that the unemployment issue in these European Union members can be solved by encouraging the economic growth. A study Stephen (2012) using an ordinary squares method on sample data over the period of 1980-2008 to examine the unemployment crisis, stabilization policy and economic growth. He reveals that unemployment negatively influences the economic development.

Also, Abdul-Khaliq et al. (2014) using sample data of 9 Arab countries during 1994-2010 to investigate the association between unemployment rate and economic progress. They observed that unemployment has adverse link with economic progress. In addition, advance economic growth can reduce the unemployment issue in Arab countries. A study Shahid (2019) using an ARDL model on sample data of Pakistan over the period of 1980-2010 investigated the influences of unemployment and inflation on economic development. Their finding shows that unemployment negatively influences the economic growth in Pakistan. And he suggested that controlling population growth, government expenditure, political stability, proper education system and encouraging the self-employment are required to support in reducing the unemployment rate.

Moreover, Yelwa et al. (2015) using an ordinary east squares method on sample data of Nigeria over the period 1987-2012 to analyze the association amongst unemployment, inflation, and economic development. Their finding shows that unemployment impacted negative on economic progress. A study Imran et al. (2015) using sample data set of 12 Asian

countries during 1982-2011 to investigate the association of unemployment and economic development. They observed that in long run, economic growth reduced by unemployment in these countries. They suggest that for achieving more sustainable economic growth and ensuring the people's welfare, the better option would be reduction in unemployment rate. While, Conteh (2021) using unit root test and the ADF Co-integration test on sample Liberia over the period of 2001-2019 to investigate the unemployment connection with economic progress. He found that unemployment negatively effects the economic growth. A study Adelowokan et al. (2019) reported that unemployment statistically significant and negatively influences the economic growth during 1985-2015 in Nigeria by employing error correction model.

A study conducted by Kalu et al. (2021) using an ARDL model or the data sample of Nigeria over the period to 1981-2017 to observe the unemployment influence on economic growth. He observed that female unemployment positively influences the economic growth while male unemployment negatively connected with Nigerian economic growth. Another study Prasetyo and Kistanti (2020) reported that sustainable economic development is critical in lowering the rate of unemployment in Indonesia. Another study highlights the lower rate of unemployment is the key factor to stimulates economic growth (Dodds & Hess, 2020). A study conducted by Shiyalini and Bhavan (2021) to examine the influence of unemployment and inflation on economic growth during 1990 to 2016 in Sri Lanka. They observed that unemployment statistically significant and negatively correlated with economic growth in long run in Sri Lanka. Another study Priambodo et al. (2021) claimed that unemployment negatively influences the economic growth over the period of 2010-2019 in Purbalingga Regency.

Sefidbari et al. (2021) using VAR model on the sample data of Iran during 2006-2016 to examine the unemployment relationship with economic growth and observed that bidirectional causality exists between them. A study by Louail and Benarous (2021) reported

that Okun's law is valid in Algeria and suggested that enhanced labor protection leads to alleviates negative influence of unemployment on economic progress. Jaradat and Al-Hhosban (2014) using Linear Regression Method on sample data from 2000-2010 to analyze the effect of unemployment and inflation on Jordanian GDP. Their results reveal that unemployment has negative influence on Jordanian GDP. A study conducted by Li and Liu (2012) using VAR, VEC models and Granger causality test and unit root test on annual time series data for 1978-2010 to examine the controversial association among unemployment rate, inflation rate and economic growth rate in China. They found that all variables have stable equilibrium relationship in long run. In addition, unemployment influences negatively to economic growth of China.

Dritsakis and Stamatiou (2016) used ARDL model on the sample data during 1995-2015 to examine the association between unemployment and economic progress in Greece, and their findings show that variables have a negative relationship in short and long-run. They recommend that for the achievement of high unemployment rates and stable growth rates, Greek government required to establish appropriate economic policies to boost entrepreneurship and self-employment. Makaringe and Khobai (2018) used an ARDL model on sample data over the period of 1994-2016 to observe the influence of unemployment on economic development in South Africa and observed that there is statistically negative and significant association between variables in long and short run. According to the researchers, the government should establish a favorable environment and flexible labor market policies or legislation to encourage many small businesses and private sector, then existing entrepreneurship activity will be consolidated, and new entrepreneurs will be attracted to generate jobs and absorb a big pool of unemployed individuals.

Using sample data of Sri Lanka from 1991-2016 Niranjala (2019) examines the association between economic growth and unemployment. Data were analyzed by Augmented

Dickey-Fuller (ADF) and ARDL bounds testing techniques. And he found that economic growth has a long run association with unemployment in Sri Lanka. Similarly, A study observed the validity of Okun's law for Saudi economy by using annual data of Saudi Arabia (Louail & Riache, 2019). Galvez and Bulayog (2017) found that Okun's law exist in both short and long run for Philippine economy. Further they reveal that 1% rise in GDP will lessening the 0.7% unemployment in long run while in short run 1% rise in GDP will lessening the 0.95% unemployment. Suryono et al. (2020) found that economic growth of Indonesia reduces the unemployment from 1986-2018 by showing equilibrium between real GDP and unemployment rate in the long run. They reveal the validity of Okun's law in Indonesia.

Godara et al. (2020) used the OLS method on sample data of India to examine the unemployment relationship with economic growth. They found that unemployment has no negative relationship with GDP growth. Dankumo et al. (2019) found that unemployment has adverse and immaterial association with economic development and Okun's Law is not applicable for Nigeria. Using data of Jordan from 1976–2018 Saleem et al. (2021) examines the association between unemployment, and economic growth. Data were analyzed by Autoregressive Distributed Lag cointegration method. Their results show that unemployment has negative association with real GDP.

Employing the Solow model, Hamdan (2013) analyzed the employment (labor) influence on economic progress from 1995 to 2010 period. He found that economic factors were unstable during the period but after the first difference it became stable. Following Okun's law in Jordan during 1970 to 2008, Kreishan (2011) investigates the association between unemployment and economic development. Data were analyzed by simple linear regression method. Their results indicate that Okun's law is not validate in Jordan.

Abraham and Nosa (2018) used Panel Least Squares and Ordinary Least Squares test on the sample data of Sub-Saharan Africa (SSA) over the period of 1991-2017 to investigate

the unemployment rate relationship with output growth rate. They found that unemployment rate has a negative association with output growth rate in SSA. Moh'd Al-Tamimi and Mohammad (2019) employed the OLS approach on sample data of Jordan from 2009-2016 to investigate the unemployment rate influences economic progress. They found that unemployment rate has insignificant influence on economic progress. A study conducted by Ojima (2019) to investigate the unemployment association with economic development during 1980-2017 in Nigeria. He observed that unemployment has adverse linkage with economic development, which shows that unemployment reduces the economic development in Nigeria.

Hjazeen et al. (2021) conducted a study by using to examine the unemployment impact on Jordan economy. Data were analyzed by auto-regressive distributed lag model and ARDL bootstrap cointegration technique. They found that economic growth has negative linkage with unemployment in Jordan. A study conducted by Karikari-Apau and Abeti (2019) using ARDL model and Granger causality test on time-series data of China during 1991-2018 to observe the influence of unemployment on economic development. They found that unemployment has negative association with economic development in short and long run. Further reveal that unemployment and economic growth do not influence each other in China.

A study conducted by Lubbock et al. (2022) using Unit Root test and Johansen Cointegration technique on sample data of Philippine from 1991-2020 to examine the influence of unemployment, inflation, and population growth on economic progress. They found that unemployment has adverse influence on economic progress of Philippine. Augmented Dickey-Fuller (ADF) and Johansen Co-integration test were employed by Khan et al. (2008) on the time series data sample during 1960-2005 to analyze the inter-connection of GDP Growth and Unemployment in Pakistan. Their finding demonstrates that 1% change increase in GDP growth that caused to 0.63% reduction in unemployment. While 1% decline in unemployment will directs to 7.25% rise in the GDP progress. In addition, GDP Growth impacted negatively

on unemployment in the long-run period. Zabihi and Lotfi used Okun's Law Equations and Phillips Curve to investigates the association among unemployment rate beside with inflation and potential productivity advancement. They observed that output gap has negative relationship with deviation of unemployment rate.

2.6 Moderating role of Regional Integration

Regional integration is a new occurrence particularly since the Belt and Road project has initiated, and it is important because it brings together above 65 nations based on regionalization and growth theory to achieve mutual goal of sustainable development in terms of social, environmental, and economic fields. Regional integration is the process through which a collection of economies increases mutually beneficial economic operations and coordinate policies in order to achieve common economic and political goals. Integration can be achieved by boosting trade and investment, creating infrastructure, increasing mobility of people, and strengthening regional public goods' provision as well as the legal and institutional framework for policy collaboration (Huh & Park, 2018).

A parallel example is the expanding global integration of national economies through BRI. It shows that regional integration can help in a variety of ways such as expanding markets, trade advancement, regional action, digital transformation, and the development of sustainable socioeconomic aspects. According to Adshead et al. (2019), the BRI initiative is aimed to improve global coordination and boosts connectivity in order to attain sustainable development and strengthening regional integration and regional integration, so these channels can boost healthcare and human development by generating opportunities of jobs and money saving for old-age benefits.

Regional integration refers to the process of lowering barriers to international trade, boosting mobility of people, and expanding economic doings among member, as defined by

(De Lombaerde & Van Langenhove, 2006; Nye, 1968). According to the Ramon and Yiju (2009) regional integration being policy aimed at removing economic barriers and trade restrictions that obstruct the free trade among members(Ramon & Yiju, 2009). Regional integration is theoretically based on the conventional concept of international trade. The research that looked at the link between regional integration and growth in emerging nations came up with mixed outcomes. Earlier research has demonstrated that regional integration promotes growth by increasing trade and venture (Balassa, 1961; Haveman et al., 2001; Levine & Renelt, 1992).

Under open globalization theory economic integration is viewed as a required element of global economic integration. In fact, economic integration has accelerated, growing in corresponding with regional integration. In a 2003 article, Sampson and Woolcock noted that the globe had witnessed the great striving set of multilateral trade discussions effectively finished in a decade, while regional trading agreements developed. Furthermore, the relationship between the expansion of regionalism and regional integration is receiving more attention (Söderbaum & Shaw, 2003; Woolcock, 2006).

Increasing trade and undertaking, creating infrastructure, boosting social mobility, strengthen the global public products provision, and offering the legitimate and institutional foundation for international policy coordination are all arrangements of economic integration. Modern research has suggested composite regional integration measurements that can take into account multiple characteristics of economic integration. Dreher (2006) was established the globalization's KOF Index that evaluates the social, political, and economic elements of regional integration which is the most extensively used among them. The globalization's KOF Index 2017 is established on 23 variables for 187 economies over the period of 1970 to 2014.

Being a complicated course regional integration is an old phenomenon its influences the numerous facets of life such as social, political, environmental, and economic aspects in

the world (Baldwin & Forslid, 2000; Obstfeld & Taylor, 1997). Economic regional integration comprises cross-border trade, tariff and lowering trade barrier, international capital flows, immigration, diffusion of knowledge and technology across borders among other aspects. So, this topic is being most considerable debated and controversial (Samimi & Jenatabadi, 2014).

The regional economic integration empirically mixed effect on economic progress in emerging economies. There are several preceding studies which claims that regional integration positively influencing the economic growth such as (Capannelli et al., 2009; Coulibaly & Burn, 2004; Tumwebaze & Ijjo, 2015). While some studies observed that there is no or little influence of regional integration on economic development (Te Velde, 2011; Vamvakidis, 1999). In contrast, Regional Integration Agreements (RTAs) of Africa has best or disappointing impact in terms of welfare boost. As a matter of fact, the deep integration is still patchy in Africa observed by (Kayizzi-Mugerwa et al., 2014).

To explore the influence of international trade on growth, Balassa (1961) used a sectoral approach to integration. He found that regional integration impacted on growth in terms of economies of scale, competition, and technological advancement. As a result, increasing international trade benefits from technological transfer and competition (Shahbaz & Rahman, 2012). A study conducted by Bong and Premaratne (2018) used panel data of Southeast Asia from 1970–2013 to investigates whether regional integration boosts economic growth. The data were analyzed by GMM techniques. Their findings show that regional integration substantially influences the economic growth. The author suggests that public institutions should endeavor to eliminate corruption and stabilize macroeconomic and political stability as boosting international trade among member nations to accelerate regional integration and economic development in the regions.

A study conducted for 34 Asian economies over the period of 2001–2019 found that economic regional integration increases economic development in Asia's low-income

economies, emergent, and underdeveloped economies in comparison with advanced economies (Sun et al., 2021). According to Crafts (2016), trade liberalization is contributed to the economic growth. Though effective capital liberalization needed institutional quality. Samimi and Jenatabadi (2014) observed that economic regional integration's complementary reforms boost economic growth either direct or indirect manner. H. M. Nguyen et al. (2019) used ARDL and Granger causality test on sample data of Vietnam during 1986-2015 to explore the linkage between economic regional integration and economic development. They found that economic regional integration substantially and optimistically contributed to the economic development of Vietnam.

Dreher (2006) conducted a study by producing an Overall Regional Integration Index that includes three indicators such as political regional integration index (27%), economic regional integration index (36%) and social regional integration index (37%). Later, this index was used by Dreher to investigates the regional integration effect on economic progress with the sample data of 123 states from 1970 to 2000. And data were analyzed by OLS and GMM method and found that regional integration positively contributed to the economic growth. Furthermore, policy regional integration and economic growth has no relationship while economic regional integration and social regional integration positively correlated. The Swiss Economic Institute is published the Overall Globalization Index annually with the name of KOF index. Subsequently, Dat and Van investigated the regional integration's impact on economic growth by using KOF index for the sample data of 12 developed economies of North America and Europe. They observed that KOF positively contributed to the income per capita and attractiveness of FDI for these economies. Suci and Idrus (2015) reported that KOF impacted positively on regional economic development for 6 ASEAN countries over the period of 2006 to 2012.

A study conducted on Organization of Islamic Cooperation by F. Farooq et al. (2020) using GMM estimation method to investigates the influence of regional integration on economic development in 47 economies of OIC from 1991–2017. Their findings revealed that positive change in regional integration boosts economic growth in economies with well-educated employees and an effective financial system. Furthermore, they found that the income level of a country has an influence on regional integration. As a result, higher and middle-income economies gain greatly from regional integration while lower income economies benefit little by regional integration.

Moreover, F. Farooq et al. (2020) observed that in the overall sample regional integration adversely affects economic growth which varies across income-levels. So, the regional integration has positive influence in higher income level economies in OIC whereas low-income states have negative influence of regional integration. Regional integration is an ultimately driver of economic development for 43 nations during the period of 1971–2013, according to (Marques & Hörisch, 2020). In a sample of OECD economies, Zaidi et al. (2019) discovered proof for hypothesis response concerning regional integration and economic development. A study conducted to explore the regional integration's impact on economic growth by (Nathaniel & Olaife, 2021). They found that social and economic regional integration positively influences the economic growth in Turkey, but political regional integration impacted negative.

Similarly, regional integration positively contributed to the economic growth of OIC countries reported by (Samimi & Jenatabadi, 2014). Further they observed that regional integration impact is dependent on the country's income-levels. Thus, regional integration has positive influence in higher income level economies whereas lower-income economies have negative influence of regional integration. According to (Lapuente & Van de Walle, 2020; Yang et al., 2020), economic regional integration statistically positive and significantly

influencing the economic growth, though the absorption capacity of this integration determines the development level of an economy. By using cointegration and causality test Omolade et al. (2013) examined the regional integration and economic growth connection in Nigeria. And observed that FDI is being noteworthy factor of regional integration which is substantially contributed to Nigerian economic growth.

Amponsah investigated the regional integration's trade policy implications in the African context. He observed that regional integration contributed to economic growth via importation of idea knowledge, intermediate inputs, and investment products. Therefor he suggests the economic strategy should be ruled based, transparent, and externally adapted to boost trade and economic growth. In West Africa, process of regional economic regional integration reviewed by Ajayi (2005) by employing gravity model to examine the further integration's prospects amongst ECOWAS economies. Their findings show that relaxing trade limitations leads to reduction in internal transport expenses which boosts intra-regional trade that eventually stimulates the economic growth and output of member economies

According to Ogbuabor et al. (2019) economic regional integration positively influences the economic growth by the export diversification and that diversification can be in terms of product or geographical. Likewise, there is a favorable impact of economic regional integration on economic progress due to the expansion in trade confirmed by (Coulibaly et al., 2018; Jong-Wha & Wie, 2017). According to the Henrekson et al. (1997) regional integration positively contributed to the growth by expanding the traded goods volume in the region.

Titalessy (2018) conducted a study on Asian Pacific area and shows that economic and political regional integration contributed to the country's growth while social regional integration damages the country growth. The author claims that negative impact of social regional integration can be eradicated. A study conducted by Reeshan and Hassan (2017) to examine the regional integration impact on FDI and GDP. They found that economic regional

integration positively impacted on FDI while negative on GDP. In short, regional integration has negatively influence on FDI and GDP. On the other hand, results reveal that political regional integration negatively influences the FDI but positively impacted on GDP.

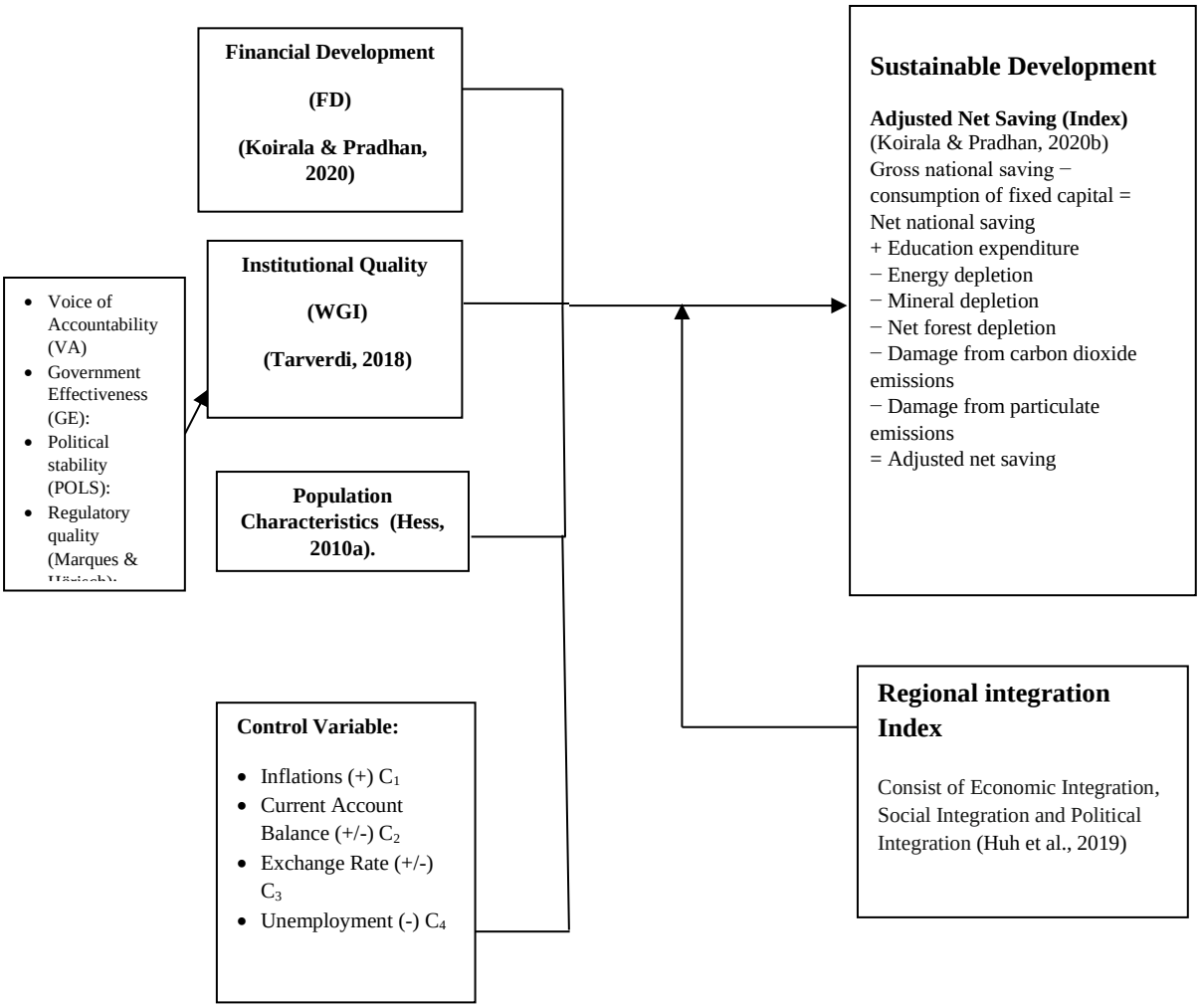
Selvarajan and Ab-Rahim (2020) recommended that policymakers prioritize regional integration in their growth strategy. The deeper regional integration comprises to enable financial sector development and further trade connectivity and lowers the asymmetric knowledge through encouraging transparency in financial sector and reporting requirements. Financial integration is being inevitable due to China's BRI Initiatives world widely demands the critical undertaking of financial integration and strengthen the well-integrated financial sector. As a result, pursuing financial development and macroeconomic reorganization will necessitate more effort in order to reap the gain of financial integration regions, allowing long-term development to deliver significant policy lessons in BRI economies. Furthermore, Xu et al. (2021) explored regional integration as a moderating variable to examine the social and economic development along with global viewpoint regarding an inevitable and irreversible trend.

Obere et al. (2013) used the GMM to explore the regional integration's impact on economic growth on the basis of regionalism and growth theory. They discovered that regional integration greatly promoted economic progress. As a result, the phenomenon of regionalization may influence the establishment of a sustainable nation. According to the Tambo et al. (2019) key to accomplishing the common goals of connectivity, economic growth through trade, human development, health care, investment, and infrastructure development. As per the Zhang et al. (2021), BRI is expected to utilize a development theory process as a moderator to its counterparts around the world. If mutual collaboration is constructive, it has the potential to reduce political instability while also promoting local development and regional advancement (Garofoli, 1993).

Summarizing the previous studies, this literature review suggests that regional integration promoting the financial development, institutional quality, population characteristics and sustainable development. Based on this literature review and development theory this study formulates the hypothesis as follows:

H_4: There is a significant moderating influence of regional integration on the impacts that financial development, institutional quality, and population characteristics have on sustainable development.

2.7 Conceptual framework



CHAPTER NO 3

RESEARCH METHODOLOGY

3.1 Data and variables measurement:

This study utilizes panel data from the longest data set over the period 2004-2020 for 64 One Belt and One Road (OBOR) countries. Empirical research employing panel data and work with panel data regarding macroeconomics, finance, regional and international fields to back policy decisions. The popularity of panel data is because of advancement in scrutinizing it with software such as Stata, to do advanced computations (Jaiswal et al., 2021). Due to its greater flexibility and efficiency this study uses a panel dataset. The dataset can discover and analyze exact statistical effects through the panel, which other methodologies cannot (Wooldridge, 2002). Our panel data set comprises a wide sample of 64 nations spanning 16 years and panel data approaches improves the econometric estimations' efficiency which are more appropriate for assessing the factors affecting sustainable development. According to Baltagi and Baltagi (2008), panel data have the advantage of being able to control for individual heterogeneity as well as a better ability to examine adjustment of dynamics, which implies less collinearity and more variability among the variables.

Furthermore, the two-step system generalized methods of moments (GMM) is more appropriate and suitable methods to control the auto correlation and ensure accuracy in inferences by taking lagged dependent variables, unattended panel heterogeneity, omitted factors bias, measurement's errors, and reducing endogeneity (Hayakawa & Qi, 2020).

Endogeneity is a significant problem with larger panel data such as the BRI countries in this study. Thus, using the panel data approach for testing with the two-step system GMM and robust check with alternate variables with same method is advantageous.

Following are the sample countries:

Table 3.1: Country Name and Country Code

Country Name	Country Code	Country Name	Country Code
East Asia			
China	CHN	Mongolia	MNG
Southeast Asia			
Brunei	BRU	Cambodia	KHM
Indonesia	IND	Philippines	PHL
Laos	LAO	Singapore	SNG
Malaysia	MYS	Thailand	THL
Myanmar, Armenia	MYM	Vietnam	VET
Central Asia			
Kazakhstan	KAZ	Kyrgyzstan	KGZ
Tajikistan	TJK		
South Asia			
Bangladesh	BGD	Nepal	NPL
Bhutan	BTN	Pakistan	PAK
India	IND	Sri Lanka	LKA
Middle East			
Bahrain	BHR	Lebanon	LBN
Iraq	IRQ	Oman	OMN
Israel	ISR	Qatar	QAT
Jordan	JOR	Saudi Arabia	SAU
Kuwait	KWT	Syria	SYR
Egypt	EGY		

Africa			
Algeria	DZA	Gambia	GMB
North Africa	NAF	Burkina Faso	BFA
Djibouti	DJI	Mali	MLI
Ethiopia	ETH	Senegal	SEN
Mauritius	MAU	South Africa	SAF
Rwanda	RWA	Kenya	KEN
Europe			
Albania	ALB	Latvia	LVA
Armenia	ARM	Lithuania	LTU
Azerbaijan	AZE	Macedonia	MAC
Belarus	BEL	Moldova	MDA
Bulgaria	BUL	Poland	POL
Croatia	CRO	Romania	ROM
Czech Republic	CRZ	Russia	RUS
Estonia	EST	Serbia	SRB
Georgia	GEO	Slovakia	SVK
Hungary	HUN	Slovenia	SVN
		Turkey	

Some countries are part of One Belt and One Road initiative but excluded from sample because unavailability of data: Timor-Leste, Turkmenistan, Uzbekistan, Afghanistan, Maldives, Iran, Palestine, United Arab Emirates, Yemen, Bosnia and Herzegovina, and Montenegro.

Several indices of sustainable development have evolved over time because of failure of taking income and GDP indicators as valid for sustainable development. The different indicators were determined by Strezov et al. (2017) for estimating sustainable development, those indicators are namely, SSI (Sustainable Society Index), HPI (Happy Planet Index), GWI (Global Well-Being Index), GSI (Genuine Savings Index), CWI (Change in Wealth Index), EPI (Environmental Performance Index), ESI (Environmental Sustainability Index), EF (Ecological Footprint). These indicators were evaluated on their ability to examine the

sustainable development's dimensions such as social, environmental, and economic. The two indicators are more comprehensive such as GSI and SSI which based on the three dimensions of sustainable development, but other indicators are restricted to environmental and economic dimensions such as socio-environmental or socio-economic dimension.

The availability of data is only till 2014 regarding Sustainable Society Index (SSI). Though, the Genuine Savings Index (GSI) was proposed by the World Bank in the 1990s which is most relevant, comprehensive, up-to-date index and grounded on adjusted net saving. This index is based on three dimensions: social, environmental, and economic elements. It was last revised in 2020. Formally, adjusted net saving recognized as genuine saving based on social, environmental, and economic dimensions.

The adjusted net saving index used to measure the dependent variable sustainable development, which is widely acknowledged as a comprehensive measure for all three elements of sustainable development (Ferguson et al., 2020; Guney & Tepe, 2017; Koirala & Pradhan, 2020).

In the updated statistic, adjusted net saving comprises certain omissions damage based on sustainable social, environmental characteristics and economic that compute saving considering all factors such as social capital, natural capital, physical capital, knowledge stock, and economically worthiness. Based on the Hartwick Rule's reformation, Pearce et al. (1990) introduced the adjusted net saving (ANS) as an indicator of sustainability. Though, adjusted net saving was proposed by World Bank as compressive index for sustainable development which was updated based on the Changing Wealth of Nations 2018 for future sustainable development. Utilizing the Genuine Savings Index (GSI) was recently recommended by Koirala and Pradhan (2020) which is based adjusted net saving rate index of World Bank. The intendent variables are financial development, Institutional quality, and Population

characteristics. I also considered the effect of control variables: inflation, account balance, exchange rate and unemployment. Regional integration is the moderating variable based on regional integration's dimensions such as political, social, and economic concerning 0-100% of higher value for greater regional integration and proxy recommended. The governance index for institutional quality comprises six indices of development namely, rule of law, government effectiveness, absence of terrorism, voice and accountability, control of corruption, political stability, and regulatory quality (Castro & Lopes, 2022; Hashmi et al., 2021; Ullah, Pinglu, Ullah, Qaisar, et al., 2022).

The comprehensive data description and measurement presented in below table:

3.2 Variables Data Description and Measurement

Table 3.2: Data Description and Measurement

Indicator	Data Description, Measurement,	Followed studies	Data Source
	Dependent Variable		
Sustainable Development	$\text{ANSR} = \frac{\text{NNS} + \text{CSE} - \sum \text{R}_{\text{n,i}} - \text{CD}}{\text{GNI}}$ Where, ANS = Adjusted Net Saving Rate, NNS = Net National Savings, CSE = expenditure on education, Rn,i = Rent from depletion of natural capital I (mineral depletion + energy depletion + net forest depletion), CD = Damages from carbon dioxide and particulate emissions, GNI = Gross National Income at Market Prices. ANSR is the fraction of GNI and found by dividing adjusted net savings (ANS) with GNI. Where, Net national savings (NNS) = (Gross national saving − consumption of fixed capital). Staff of World bank based on	Proxy followed from (P. Hess, 2010; Kaimuri & Kosimbei, 2017; Koirala & Pradhan, 2020)	WDI, World Bank https://data.worldbank.org

	the Changing Wealth of Nations 2018: Building a Sustainable Future described sources and methods in (Lange et al., 2018).		

3.3 Independent Variable

Financial Development (FDV)	Financial development (FD) is annual percentage and measured by trade to GDP.	Rahman et al. (2020) and Shahbaz et al. (2022)	World Bank and OECD GDP estimates
Population Characteristics	APL (population total percentage average between the ages of 15 and 64 years). APL is also called population age structure. Adopted by (P. Hess, 2010; Hess & Ecology, 2010) Population shares of 65 and older years increased tend to reduce the national saving rate. Population which counts all residents based on the de facto definition.	Lubbock et al. (2022), (Andrle et al., 2018; Castro & Lopes, 2022), (Z. Liu et al., 2022).	WDI, World Bank
Institutional quality	The governance composite is based on word development six indicators rule of law, control of corruption, regulatory quality, political stability & absence of terrorism, government effectiveness, and voice & accountability: **Voice of Accountability (VA):** It considered the rights of speech to citizen, how much public have freedom to speech, participate in general voting and to become part of government. **Government Effectiveness (GE):** It measures the government credibility, role of government in delegating authorities in terms of freedom, civil rights, public services, and commitment on all set policies of constitution. **Political stability (POLS):** It measures how much government is stable and the likelihood to change it due to unknown and unrealistic circumstance. It considers any violent means which break the general law.	(Castro & Lopes, 2022; Hashmi et al., 2021; Ullah, Pinglu, Ullah, Qaisar, et al., 2022).	The World Bank https://info.worldbank.org/governance/wgi/ ICRG

	Regulatory quality (Marques & Hörisch): It measures how much the government is effective in rule of law and implications of policies which boost private development and open market. **Corruption (CC):** It assesses the extent of societal perception focused on personal profit, encompassing various forms of both small and large-scale private earnings. If effectively managed, a powerful and dominant regulatory institution can play a significant role in implementing policies related to this issue/ **Rule of Law (RL):** It determines how much rule of law is dominant, how is the justice system and courts, how is general administration like police, property right and the possibilities of crime and violence.		

3.4 Moderating Variable - Interaction Term

Regional integration Index	Based social, political, and economic dimensions of regional integration concerned on 0 to 100 points of higher values denote greater regional integration. Social regional integration refers to the level of integration among regions based on personal interactions and connections. This can be measured through various factors such as international telecom traffic, degree of tourism, transfers, foreign population, number of international letters, number of internet users, the share of households with a television set, trade in newspapers, trade in books, and the presence of McDonald's restaurants and Ikea stores in a country. These indicators provide insights into the extent of social interconnectedness and cultural proximity among regions. Political regional integration based on the number of high commissions and embassies in a country; the	Adopted and recommended by (Huh & Park, 2021).	The Swiss Institute of Technology in Zurich; Global Economy Website

	country is a member of international organizations number; UN peace missions as well a country participated in number; and between two more stated treaties signed number. Economic regional integration based on economic actual flows (trade data, portfolio investment, and FDI) and trade and capital restrictions (mean tariff rates, hidden import barriers, index of capital controls, and taxes on international trade as a share of current revenue).		

3.5 Control Variable:

Inflation (INFL)	The inflation variable is the annual percentage change in the consumer price index and used to proxy macroeconomic (in)stability. Inflation, consumer prices (annual %)	Shahid (2019), Shiyalini and Bhavan (2021)	International Financial Statistics & WDI
Current account deficit	Current account deficit (% GDP)	(Destek & Sinha, 2020; Yurdakul & Ucar, 2015)	WDI
Exchange rate	CPI-based Real Effective Exchange Rate (REER): Index. An increase indicates an appreciation of the national currency	Kong (2021) and Morina et al. (2020)	WDI, IMF & IFS
Unemployment	Unemployment proxy by Unemployment, total (% of the total labour force)	Lubbock et al. (2022)	WDI

3.6 Econometric Modeling:

The expanded Solow standard economic growth model serves as the foundation for the theoretical framework. According to the Cobb-Douglas function of a country's production output,

$$\frac{sy}{Y} = \Phi + \alpha \left(\frac{dy*}{y*}\right) - \beta n + \gamma\omega + \rho \qquad (1)$$

where Eq (1) states that economic growth rate is directly correlated with the net savings' rate (s).

However, in terms of the sustainable development model, the economic growth rate would be adversely correlated with the rate of natural resource depletion, the rate (ω), and the rate of population growth (p). The reason for including the depletion of natural resources in the proposed saving model is to demonstrate the potential impact of diminishing natural capital on the savings behavior of future generations. This incorporation highlights how the decline in natural resources can influence the levels of saving. In addition, y represents the real national output, y* represents output per capita, and (n) represents the labor force growth rate. Shares of input are α, β, and γ reflects all of the linked parameters, including the rate of growth, and is equal to g +α f + β m + γ*h*. The growth rates of the production factors K (capital), L (labor), and R (natural resources) are shown by (f), (m), and (h), respectively, whereas the rate of technological advancement is shown by (g). The latest capital products should use current technologies, which should result in positive progress in capital quality (f > 0). The development of human capital would be indicated by investments in health, education, and nutrition, which are simultaneously expected to be positive (m > 0) effects on labor quality improvement.

Following past studies, it is possible to write a relationship between the sustainable development (adjusted net saving) and its drivers in relation to the model mentioned before (Ullah, Pinglu, Ullah, & Hashmi, 2022). In Equation (2), SD stands for Sustainable Development, FD for Financial Development Index, IQ for Institutional Quality, and APL for population characteristics as Independent variables. The moderating factor for regional integration is regional integration Index. In addition, control variables include INF for the

inflation rate, CD for current account deficit, RER for real exchange rate, UEMP for unemployment rate, and RII for regional integration index.

$$\text{SD (ANSR)} = \int (\text{FD, IQ, APL, INF, CD, RER, UEMP, RII}) + \varphi_t + \varepsilon_{it} \qquad (2)$$

3.7 Estimation Techniques:

3.7.1 Cross-Sectional Dependence Test*:*

The detection of cross-sectional dependence in panel data analysis is considered crucial due to its potential to generate inconsistent estimates and misleading information (Grossman et al., 1989; Ulucak & Bilgili, 2018).

To address this issue, Breusch and Pagan (1980) introduced Lagrange Multiplier (LM) statistics as a method to identify cross-sectional dependence in panel data.

However, Pesaran et al. (2004), argued that the Breusch-Pagan LM test may suffer from inconsistency. To rectify this bias, Pesaran et al. (2004) proposed the CD test as an adjustment to the LM test, which is as follows:

$$CD = \sqrt{\frac{2T}{N\,(N-1)}} \sum_{i=1}^{N-1} \sum_{j=i+1}^{N} \frac{(T-K)\rho_{ij}^2 - E\left[(T-K)\rho_{ij}^2\right]}{var\left[(T-K)\rho_{ij}^2\right]} \qquad (4)$$

Where N is the sample size, T indicates the time frame, and ρ_{ij} denotes the pair-wise correlation coefficient derived from OLS estimation for each cross-sectional dimension i.

3.7.2 Panel Unit Root Test:

First-generation panel unit root tests like Phillips-Perron (PP), Augmented Dickey-Fuller (ADF), Im-Pesaran-Shin (IPS), Levin-Lin Chu (LLC) are invalid under the impact of cross-sectional dependence (Pesaran, 2007). In order to address this issue, Pesaran (2007) created the cross-sectionally augmented Dickey-Fuller (CADF) and the cross-sectionally augmented Im-Pesaran-Shin (CIPS), two second-generation panel unit tests that are

trustworthy when cross-sectional dependence is present. The following formula can be used to calculate the CADF statistic:

$$\Delta y_{i,t} = \alpha_i + \beta_i y_{i,t-1} + \gamma_i \bar{y}_{t-1} + \delta_i \Delta \bar{y}_{i,t} + \varepsilon_{it} \quad (5)$$

Where $\bar{y}_{t-1}$ for cross-sectional averages of lagged levels and $\Delta\bar{y}_{t-1}$ for first differences of individual series.

$$\bar{y}_{t-1} = \frac{1}{N}\sum_{i=1}^{N} y_{i,t-1} \quad (6)$$

$$\Delta\bar{y}_{t-1} = \frac{1}{N}\sum_{i=1}^{N} \Delta y_{i,t-1} \quad (7)$$

The CADF statistic can be computed by averaging the CADFi as follows:

$$CIPS = \frac{1}{N}\sum_{i=1}^{N} CADF_i \quad (8)$$

Where CADF*i* is the t-statistics in the CADF regression defined by equation (8).

3.8 Empirical Estimation–Two-Step System GMM

Compared to single-equation models and procedures, generalized methods of moments (GMM) yield better results with accurate model specifications. GMM with a two-step process is the most appropriate when the distribution of the dependent variable is unknown (Ali, 2020). To eliminate the autocorrelation problem that plagues the static regression model and turn the GMM into a dynamic model by taking the lag-value of SD into account. In order to predict the future more precisely over the long term, GMM controls the lag-effect of its own dependent variable, SD, and thereby offers more effective and accurate estimates. Therefore, this technique was used and favoured for the panel dataset in earlier investigations (Ahmad et al.,

2021; Arminen & Menegaki, 2019). The GMM estimator is ideally equipped to address the potential endogeneity problems.

The two-step system GMM's econometric feature comprises both OLS and 2SLS, where 2SLS shows a particular application of the two-step system GMM. The system GMM is the augmented estimator (Bond & Windmeijer, 2002). Due to their resistance to heteroscedasticity and autocorrelation, two-step GMM (of which Arellano-Bond has both one and two-step variations) are more effective. When N (number of cross-sections) exceeds T (period), then two-step system GMM will be beneficial. Due to the best alternative internal instruments, it is a great case to adopt the GMM strategy suggested by (Roodman, 2009) rather than minimizing the difference and two-system GMM.

The outcomes of the two-step system GMM since it produces robust standard errors by addressing the issues of heteroscedasticity, cross sectional dependence, and auto-correlation present (Dar et al., 2020; Driscoll & Kraay, 1998). As a result, the alternate variables support the two-step system GMM's prior findings and acts as a good alternative robust technique.

The two-step system GMM's functional form is represented as:

$$Y_{it} = X_{it}\beta + \vartheta\gamma_{i,t-1} + \varphi_t + \varepsilon_{it} \qquad (9)$$

Arminen and Menegaki (2019) and Ahmad et al. (2020) proposed that time is represented by the subscript t (here in our sample period of 16 years), whilst the cross-sectional units are marked by subscript I (here in our sample, 64 countries). The error term is believed to be made up of the fixed individual effect ε_{it} bearing the following properties: E [ci] = E [ε_{it}] = [ciε_{it}] = 0, With idiosyncratic shocks, it was attempted to remove the individual fixed effects by taking the difference of Eq (9). As a result, this condition can be expressed as:

$$\Delta Y_{it} = \Delta X_{it}\beta + \vartheta\Delta\gamma_{i,t-1} + \varphi_t + \varepsilon_{it} \qquad (10)$$

where the differenced operator is Δ in Eq (10).

The econometric model can be expressed as follows by using the equations and studies from the aforementioned papers (Arminen & Menegaki, 2019; Koirala & Pradhan, 2020; Teng et al., 2021).

The two-step system GMM direct-channel dynamic econometric model is explained as follows:

$$SD_{i,t} = \alpha_0 + \beta_1(SD)_{i,t-1} + \beta_2(FD)_{i,t} + \beta_3(IQ)_{i,t} + \beta_4(APL)_{i,t} + \beta_5(\text{Control Factors}) + \varphi_t + \varepsilon_{it} \quad (11)$$

The association between the factors and sustainable development (ANS) was moderated by the interaction term of regional integration index. These interaction terms (determinants of SD*RII) are used in the model specifications. The interaction term of FD*RII, IQ*RII, and APL*RII, as well as the static and dynamic models of the two-step System GMM, are described as follows in Eq. 12–15.

In a dynamic model of a two-step system GMM, the interaction term between financial development and regional integration index can be explained as follows:

$$SD_{i,t} = \alpha_o + \beta_1(SD)_{i,t-1} + \beta_2(FD)_{i,t} + \beta_3(IQ)_{i,t} + \beta_4(APL)_{i,t} + \beta_5(FD * RII)_{i,t} + \beta_7(\text{Control Factors}) + \varphi_t + \varepsilon_{it} \quad (12)$$

In a dynamic model of a two-step system GMM, the relationship between institutional quality and regional integration Index can be characterized as follows:

$$SD_{i,t} = \alpha_o + \beta_1(SD)_{i,t-1} + \beta_2(FD)_{i,t} + \beta_3(IQ)_{i,t} + \beta_4(APL)_{i,t} + \beta_5(IQ * RII)_{i,t} + \beta_7(\text{Control Factors}) + \varphi_t + \varepsilon_{it} \quad (13)$$

In a dynamic model of a two-step system GMM, the interaction term between population characteristics share and regional integration index can be explained as follows:

$$SD_{i,t} = \alpha_o + \beta_1(SD)_{i,t-1} + \beta_2(FD)_{i,t} + \beta_3(IQ)_{i,t} + \beta_4(APL)_{i,t} + \beta_5(APL * RII)_{i,t} + \beta_7(\text{Control Factors}) + \varphi_t + \varepsilon_{it} \quad (14)$$

where SD (ANSR) stands for sustainable development, and ANSR stands for adjusted net saving rate that is used as proxy for Sustainable Development. FD stands for financial development, IQ for institutional quality, APL for population characteristics, and RII for regional integration index. And other control factors are inflation, current account deficit, real exchange rate and unemployment.

Chapter 4

RESULTS AND DISCUSSION

4.1 Results of Cross-Sectional Dependence (CSD) Tests

The outcomes of the Unit Root and CSD (Cross-Sectional Dependence) tests for several models under fixed effects and random effects specifications are shown in Table 4.1. Pesaran's test of cross-sectional independence was run on Models 1 through 4. The test statistics for fixed effects were 11.240, 11.514, 11.359, and 11.517, respectively. All of these values are highly significant and provide strong evidence that the data do not exhibit cross-sectional dependency. The test statistics in the random effects specification were, in order, 9.717, -0.990, 0.953, and 0.274. The statistics for Model 2 was not significant, implying some possible cross-sectional dependency, whereas the statistics for Models 1, 2, and 3 were extremely significant, showing no cross-sectional dependence. These findings shed light on the existence of cross-sectional dependence and the decision to use random effects or fixed effects models in the study.

Table 4.1 CSD Tests

Test	Fixed Effect	Random Effect
Model 1: Pesaran's test of cross sectional independence	11.240***	9.717***
Model 2: Pesaran's test of cross sectional independence	11.514***	-0.990
Model 3: Pesaran's test of cross sectional independence	11.359***	0.953
Model 4: Pesaran's test of cross sectional independence	11.517***	0.274

4.2 Results of Second-Generation Unit Root Tests

The results of second-generation unit root tests for different variables in both levels and initial differences are shown in Table 4.2. These tests include the Cross-Sectionally Augmented Dickey-Fuller (CADF) test and the Cross-Sectionally Augmented IPS (CIPS) test. Whether the variable requires differencing to attain stationarity (I(1)) or is stationary at the level (I(0)) is shown in the "Decision" column. For instance, both tests find that the following variables are stationary at the level (I(0)): globalization, inflation rate, institutional quality, and sustainable development. The first difference tests show significant results for Financial Development, Exchange Rate, Unemployment, and Current Account Balance, indicating that differencing is necessary to attain stationarity (I(1)). The Earning Population test yields inconsistent findings; it requires differencing based on the CIPS test yet remains stationary according to the CADF test.

Table 4.2 Results of Second-Generation Unit Root Tests

	CIPS			CADF		
Variables	Level	First difference	Decision	Level	First difference	Decision
Sustainable Development	-2.663**	-	I(0)	-1.921*	-2.635***	I(0)
Financial Development	-3.248***	-4.402***	I(0)	-1.713	-3.246	I(1)
Institutional Quality	-2.557*	-3.601***	I(0)	-2.168***	-	I(0)
Earning Population	-1.556	-4.182***	I(1)	-1.655	-2.304***	I(1)
Globalization	-3.091***		I(0)	-2.078***		I(0)
Inflation Rate	-3.091***	-	I(0)	-2.377***	-	I(0)
Exchange Rate	-1.234	-2.473***	I(1)	-1.145	-2.102	I(1)
Unemployment	-2.221	-3.380***	I(1)	-1.879	-2.002	I(1)

Current Account Balance	-2.568*	-3.381***	I(0)	-1.728	-2.840	I(1)

*** p<0.01, ** p<0.05, * p<0.1 *, ** and *** represent 1%, 5% and 10%, respectively.

4.3 Results of Descriptive Statistics

Table 4.3 demonstrates the descriptive summary for the sample variables in terms of the mean, observation count., standard deviation, min, and max values. So, this table demonstrate all dependent, independent and control variables have 1024 observations for 64 nations over the period of 2005 to 2020. In descriptive statistics mean explains the measure of central tendency of the complete sample on the other hand minimum, maximum and standard deviation explains the variability of data. Standard deviation indicate how far away data from the average value of the mean, shows that there is a typical amount of dispersion around the mean and that results are typically close to the mean of the entire sample.

Table 4.3 Descriptive Statistics

Variables	Obs	Mean	Std. Dev.	Min	Max
Sustainable Development	1024	10.752	11.768	-15.86	38.201
Financial Development	1024	.308	.17	.076	.718
Institutional Quality	1024	0	.992	-1.757	3.405
Earning Population	1024	65.712	6.445	49.892	84.678
Inflation Rate	1024	5.216	4.928	-1.3	26.8
Exchange Rate	1024	7419.206	2637.302	.28	16302.25
Unemployment	1024	7.664	5.936	.14	37.25
Current Account Balance	1024	4.528	26.472	-44.62	164.76

4.4 Outcomes of Pairwise correlations

Table 4.4 displays the pairwise correlation among the dependent, independent and control variables. Findings of One Belt and One Road countries shows that independent

variables FD, Gov and APL have positive correlation at 29.2%, 24.8%, 32.3% respectively, with dependent variable at 1% significance level. Sustainable development increases as the FD, Gov and APL significantly increases. On the other hand, control variables INF, EXR, UER except CAB have negative correlation at 8.8%, 7.3%, 33.4% respectively, with the sustainable development at 1% significance level. While CAB has a positive correlation at 32.8% with the sustainable development at 1% significance level. Increase in INF, EXR, UER reduces the sustainable development. All variables are significant at 1% significance level. Thus, study indicates that there is significant correlation exist amongst dependent, explanatory and control variables and their results have strongly supported the study's objective and hypotheses.

Table 4.4 Pairwise correlations

Variables	(y)	(FD)	(IQ)	(APL)	(Inf)	(Exr)	(Uer)	
SD	1.000							
FD	0.292***	1.000						
IQ	0.248***	0.418***	1.000					
Apl	0.323***	0.523***	0.395***	1.000				
Inf	-0.088***	-0.279***	-0.322***	-0.117***	1.000			
Exr	-0.073**	-0.040	-0.189***	-0.033	0.060*	1.000		
Uer	-0.334***	-0.053*	0.037	-0.014	-0.099***	-0.210***	1.000	
Cab	0.328***	0.340***	0.082***	0.274***	-0.101***	-0.076**	-0.166***	1.000

**** p<0.01, ** p<0.05, * p<0.1*

Sustainable Development(y), Financial Development (FD), Institutional Quality (IQ), Earning Population (APL) Inflation Rate (Inf), Exchange Rate (Exr), Unemployment (Uer), Current Account Balance

4.5 Results of Variance inflation factor without year effect

Table 4.5 demonstrates the variance inflation factor (VIF) without regard to the year effect. VIF has calculated for independent variables FD, APL, GOV, and control variables such as CAB, INF, EXR, and UER to ensure that no multicollinearity exist in this study sample data.

If the VIF is higher than 5 for any variable, then it shows that there are multicollinearity issues for a specific variable (Mahmood et al., 2019). So, Table 4.5 shows that all VIF values of variables are less than 5, which confirms that this study data has no multicollinearity issues.

Table 4.5 Variance inflation factor without year effect

	VIF	1/VIF
Financial Development (FD)	1.646	.608
Earning Population (Apl)	1.5	.667
Institutional Quality (IQ)	1.434	.697
Current Account Balance	1.21	.826
Inflation Rate (Inf)	1.175	.851
Exchange Rate (Exr)	1.103	.907
Unemployment (Uer)	1.1	.909
Mean VIF	1.31	

4.6 Results of Variance inflation factor with year effect

Table 4.6 present the variance inflation factor (VIF) with the year effect. VIF has calculated for independent variables FD, GOV, APL, and control variables such as INF, EXR, and UER to ensure that no multicollinearity exist in this study sample data. If the VIF is higher than 5 for any variable, then it shows that there are multicollinearity issues for a specific variable (Mahmood et al., 2019). So, Table 4.6 shows that all VIF values of variables are less than 5, which confirms that this study data has no multicollinearity issues.

Table 4.6 Variance inflation factor with year effect

	VIF	1/VIF
Financial Development (FD)	1.575	.635
Institutional Quality (IQ)	1.427	.701
Earning Population (Apl)	1.489	.671
Inflation Rate (Inf)	1.44	.694
Exchange Rate (Exr)	1.087	.92
Unemployment (Uer)	1.078	.928
2005.year	1.876	.533
2006.year	1.878	.532
2007.year	1.883	.531
2008.year	1.896	.528
2009.year	2.037	.491
2010.year	1.891	.529
2011.year	1.89	.529
2012.year	1.896	.527
2013.year	1.89	.529
2014.year	1.892	.528
2015.year	1.897	.527
2016.year	1.902	.526
2018.year	1.904	.525
2019.year	1.896	.527
2020.year	1.901	.526
Mean VIF	1.744	.

4.7 Results of Direct Channel

4.7.1 Main Results

Table 4.7.1 presents the estimation of sustainable development using the two-step Sys-dynamic GMM's final model and robustness testing using alternate variables. The two-step system GMM's final model is shown in Column 1. So, the two-step system GMM Column 1's final model findings reveals that the dependent variable sustainable development lag is positive with 0.901 at a 1% significance level which shows the sustainable development in dynamic nature in BRI countries. It indicates that 1% change increase in independent and exploratory variables will increase 90.1% of sustainable development at 1 % significance level. Additionally, the findings reveal that financial development (FD) coefficient is significant and positive value of (11.376) at 1% significance level. It means that 1% change increase in FD will increase 11.376% of sustainable development of BRI countries. The findings are consistent with the Beyene (2022), who found that financial development and governance index positively and significantly influences the country's economic progress using GMM estimation technique during 2005-2020. The outcomes are concurred with the study of Nguyen and Pham (2021), they found that financial development is substantial factor of economic growth transitional economies.

Another independent variable, institutional quality (IQ-WDI) coefficient is significant and positive with (2.808) value at 1% significance level which shows that 1% change increase in IQ will increase 2.88% of sustainable development of BRI countries. The outcomes are consistent with (Tran et al., 2021), they found that institutional quality is critical factor of economic development in addition, institutional quality more effectively performs in the lower-income Asian countries towards economic growth in comparison to the higher-income states. The results are also supported with the study of (AlShiab et al., 2020), they observed that in

both emerging and developed countries governance quality positively influences the economic growth.

The third and last independent variable earning population (APL) coefficient is negative but significant with (-0.192) value at 5% significance level. It means that 1% change increase in APL will -0.192% decreases the sustainable development of BRI countries. The outcomes are consistent with the Pham and Vo (2019), they reveal that higher young people dependency share (14 years or younger) negatively influences the economic growth in long run for 84 developing economies while old dependency share (65 years old or above) is positive in long run towards economic progress. The outcomes are also supported with the study of Song et al. (2013) who shows that young population and total population negatively influences the economic growth while the working people ratio and working population positively contributed to economic progress of the selected Asian economies. So, these results show that favorable change in demographic have had a significant impact on speedy-growing Asian economies.

Furthermore, the control variables findings reveal that, Inflation rate (INF) is optimistic and significant with (0.167) at 1% significance level. Thus, 1% change increase in INF will 0.167% increase the sustainable development of BRI countries. The outcomes are in line with the Khan and Khan (2018), they discovered that inflation has a statistically weighty and adverse influence on economic progress in all selected Asian countries for the period 1973-2016. The outcomes are also supported by study of Lubbock et al. (2022), they found that inflation positively influences the economic growth.

Another control variable Exchange Rate (EXR) is positive and significant with value (0.001) at 10% significance level. It means that 1% change increase in EXR will 0.001% increase the sustainable development of BRI countries. The outcomes are in line with the

Missio et al. (2015), their findings shows that economic growth of 63 developing economies positively influenced by the sustaining a competitive level of real exchange rate. It means that currency depreciation may affects the economic sustainable development by boosting the income elasticity of exports demand. The findings are in line with Kong (2021), their findings indicate that exchange rate appreciation helps to boost economic development. Exchange rate appreciation supports economic growth more effectively when the local currency's value is high, while exchange rate appreciation less effectively promotes economic growth when the local currency's value is low.

The third control variable, unemployment (UER) is negative and not significant with (-0.053) value. It shows that 1% change increase in the UER will -0.053% hurts the sustainable development of BRI countries. The outcomes are supported by Conteh (2021), who found that unemployment negatively effects the economic growth. The outcomes are consistent with the study of Saleem et al. (2021), their results show that unemployment has negative association with real GDP. The results are also supported by (Abraham & Nosa, 2018), they observed that unemployment rate has an adverse association with output growth rate.

The findings of all diagnostic tests for the appropriate model are listed in Column 1 of Table 4.7.1, The different diagnostic tests executed model residuals satisfy the needed assessment assumptions and certify the accurate inference and validation findings. The results demonstrate that AR1 has (0.000047) p-value for the first-order difference which is less than 5% it confirms that there is no serial correlation and zero autocorrelation in the testes model. Moreover, for second-order difference, the AR2 has (0.0518) p-value which is higher than 5% and confirms that two-step system GMM is appropriate estimation technique for this study's sample because T (16) is less than N (64).

All the dependent, independent and control variables are significant in the Wald–Chi-square test model. Furthermore, the Wald test, Chi-square test has a p-value at 1% significance

level which indicates that the model is fit for procedure in Column 1. Additionally, the Column 1 indicates that the Sargan value is 93.18 and Hansen value is 36.04 with a p-value of 0.285. According to the Hansen and Sargan tests extreme identification of restrictions stimulates instrument's reliability while does not support the null hypothesis. To summarize the diagnostic test results achieved all the needed assumptions of assessment by confirming the consistency and accuracy of the applied approach, as shown in Table 4.7.1.

4.7.2 Results of robustness check for direct channel

The two-way robustness testing validates the direct channel of independent variables effect on the dependent variable of BRI member nations results, as shown in Table 4.7.1, columns 2 and 3. Foremost, the outcomes' accuracy was verified by replacing alternate indicator and re-analyzing using the same procedure of Column 1. The appropriate robustness model of the two-step system GMM displays the results of each diagnostic test in Table 4.7.1, Column 2. As a result, Column 2 shows that the estimated model's residual has been subjected to numerous diagnostic tests, including the AR1, AR2, Wald-Chi-square, Hansen, and Sargan tests. So, the applied model ensures the accurate inference and is up to the mark. Therefore, the evaluated outcomes shows that the model is reliable which meets all the assumptions and shows the paramount model consistency of robustness.

Column (2) of the final re-estimated model shows that the sustainable development coefficient is (0.860) at 1% significance level. The independent variable, FD is positive and significantly impacts sustainable development of BRI countries with coefficient value (7.399) at 10% significance level. The outcomes are consistent with the (Khemani & Kumar, 2022), their findings reveal that financial development positively contributed to achievement of Sustainable development goals. The outcomes are supported by (Bakar et al., 2020), they observed that financial sector has robust favorable effect on economic progress.

Institutional Quality (IQ-ICRG) is positively and significantly contributed to the sustainable development of BRI countries with coefficient value (2.718) at 1% significance level. It means that 1% change increase in the IQ (ICRG) will increase 2.718% of sustainable development which is similar to Institutional Quality (WDI) of main model. The results are constant with the study of (AlShiab et al., 2020), they observed that in both emerging and developed countries governance quality positively influences the economic growth. The results are supported by (Singh & Pradhan, 2022), they demonstrate that institutional quality (governance indicators) favorably contributed to the economic performance in long run while no effect on economic development in the short run.

While APL has a 5% significance level detrimental impact on sustainable development in BRI countries. The outcomes of the APL match those of the primary model. The results are consistent with the Bawazir et al. (2020), they revealed that the old dependency ratio and all ages of the worker population's growth rate have a positive influence on economic growth, whereas the young dependency ratio has a negative influence. The results are supported by research of Ven and Smits (2011), they demonstrated that two the proportion of the working-age populace and the pace at which it grows have a considerable beneficial effect.

The study's robust results are listed in Column 3 of Table 4.7.1 Additionally, the CAB Robust variable is used in Column 3 as a control variable, while all other variables are similar to the Main and Robust 1 models' variables. The CAB is positive and significantly influencing the sustainable development of BRI countries at 10% significance level. The results are consistent with the Mugo et al. (2021), they observed that current account deficits significantly and positively influence the economic growth. The results are consistent with the research of Ven and Smits (2011), their finding reveals that current account balance has relationship with real gross domestic product (GDP) growth in long run. Due to real GDP growth and the current

account balance have a positive connection, a rise in real GDP growth will result in a better current account balance.

The cross-sectional dependence of the static two-step sys-primary GMM model was confirmed using the alternate variables. The two-step sys-GMM primary model's outcomes are generally validated by alternate variables results. Results demonstrates that there is no cross-sectional dependence issue, such as endogeneity, in the primary model because the two-step system GMM is an effective and appropriate case of OLS, fixed effect, and 2SLS. As a result, this approves the two-step system GMM's final model.

Table 4.7.1 Direct Results of two-step system GMM and 2SLS

	(1)	(2)	(3)	(4)
	Two-Step System GMM (1-3)			2SLS (4)
Dependent variable: SD	Final Model	Robust 1	Robust 2	Robust 3
L. Sustainable	0.901***	0.860***	0.849***	
Development	(0.022)	(0.017)	(0.019)	
Financial Development	11.376***	7.399*	8.156**	84.809*
(FD)	(3.500)	(3.784)	(3.322)	(44.930)
Institutional Quality (IQ-	2.808***			
WDI)	(0.605)			
Institutional Quality (IQ-		2.718***	2.807***	51.446**
ICRG)- Robust		(0.676)	(0.678)	(22.026)
Earning Population (APL)	-0.192**	-0.223**	-0.264***	-6.667**
	(0.094)	(0.090)	(0.089)	(2.752)
Inflation rate	0.167***	0.105***	0.117***	3.487**
	(0.038)	(0.039)	(0.038)	(1.526)

Exchange Rate	0.001*	0.001	0.001	0.003**
	(0.001)	(0.001)	(0.001)	(0.001)
Unemployment	-0.053	-0.022	-0.010	
iv	(0.051)	(0.025)	(0.026)	
Current Account Balance-			0.011*	0.338***
Robust			(0.007)	(0.121)
Constant	YES	YES	YES	YES
Year Effect (I. Year)	YES	YES	YES	YES
Diagnostic Tests (PASS)				
Observations	960	960	960	1,024
AR1	-4.067	-4.061	-4.031	
P-value	0.000047	4.88e-05	5.55e-05	
AR2	1.945	2.180	2.170	
P-value	0.0518	0.0293	0.0300	
Sargan test	93.18	99.87	100.5	0.682 (p-value
				(0.711)
Hansen test	36.04	43.82	44.30	
P-value	0.285	0.313	0.295	
Instruments (J-stat.)	54	62	63	YES
Wald CHI2 test	16689	78083	79127	
P-value	0	0	0	
Endogeneity test of				183.915
endogenous regressors				
endog- option				
p-value				0.0000

Basmann (p-value				0.6661 (0.716)
Wu-Hausman				72.901 (0.000)
Durbin (score)				183.915 (0.000)
Countries	64	64	64	64

Standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1 (Roodman, 2009) xtabond2 command, two step orthogonal).

4.8 Results of Indirect Channel

4.8.1 Moderating Effect

Table 4.8.1 shows the regional integration index (RII) moderation between financial development (FD) and sustainable development by using the GMM dynamic two-step system model. The FD and RII interaction term significantly expand the model. So, the final results of GMM dynamic two-step system model are demonstrated in column (1) with the support of Wald test and two-step Sys-GMM criteria. The results of RII moderation between FD and SD shows that dependent variable such as SD lags coefficient value is positive (0.863) at 1% significance level which indicates the sustainable development of BRI countries is in dynamic nature. At a 1% significance level, it shows that an increase in FD of 1% will result in an increase in sustainable development of 86.3%. The independent variable, FD has a positive coefficient value with (8.392) but not significant.

The moderating composite of RII has negative coefficient value with (-0.151) at 1% significance level. It means that 1% change increase in RII will -0.151% hurts the sustainable development of BRI countries at 1 % significance level. Moreover, the interaction term FD*RII shows the positive coefficient value with (0.157) but not significant. It shows that 1% change increase in interaction term FD*RII will 0.157% increase the sustainable development in BRI countries over the period of 2005 to 2020. The findings are also supported by Sun et al. (2021),

they found that economic regional integration increases economic development in Asia's low-income economies, emergent, and underdeveloped economies in comparison with advanced economies. The findings are consistent with Farouq et al. (2020) they revealed that positive change in regional integration boosts economic growth in economies with an effective financial system. So, regional integration boosts the financial development in developing countries and helps to achieve sustainable development of BRI countries.

Beside that other independent variable such as institutional quality, IQ (WDI) has positive and significant value with (2.617) at 1% significance level. Another, earning population (APL) has a negative but not significant value (-0.168). Furthermore, control variables such as inflation rate has a positive and significant value (0.158) at 1% significance level which shows that it positively influences the SD in BRI countries. Exchange Rate has positive value (0.001) and unemployment has negative value (-0.004) but both are not significant.

The findings of all diagnostic tests for the indirect channel model are listed in Column 1 of Table 4.8.1 which shows that the different diagnostic tests executed indirect channel model residuals satisfy the needed assessment assumptions and certify the accurate inference and validation findings. The results demonstrate that AR1 is less than 5% in the first-order difference which confirms that there is no serial correlation and zero autocorrelation in the testes model. Moreover, for second-order difference, the AR2 is higher than 5% and confirms that indirect channel model two-step system GMM is appropriate estimation technique for this study's sample because T (16) is less than N (64).

All the dependent, independent and control variables are significant in the Wald–Chi-square test model. Furthermore, the Wald test, Chi-square test has a p-value at 1% significance level which shows that the indirect channel model is appropriate for the Column 1 process.

Additionally, the Column 1 indicates that the Sargan value is 83.00 and Hansen value is 38.47 with a p-value of 0.274. The severe identification of limits enhances the instrument's dependability, but does not support the null hypothesis, according to the Hansen and Sargan tests. To summarize the diagnostic test results achieved all the needed assumptions of assessment by confirming the consistency and accuracy of the applied approach, as shown in Table 4.8.1.

4.8.2 Results of robustness check for indirect channel

The two-way robustness testing validates the results of indirect channel of RII moderation between FD and SD as shown in Table 4.8.1, columns 2 and 3. Foremost, the outcomes' accuracy was verified by replacing alternate indicator (i.e., institutional quality) and re-analyzing using the same procedure of Column (2 and 3). Table 4.8.1, Column 2 of the appropriate indirect channel robustness model of the two-step system GMM displays the results of every diagnostic test. Therefore, Column 2 displays the results of various diagnostic tests performed on the estimated residual of the indirect channel model, including AR1, AR2, Wald-Chi-square, Hansen, and Sargan tests. So, the applied model ensures the accurate inference and is up to the mark. Therefore, the evaluated outcomes show that the indirect channel model is reliable which meets all the presumptions and exhibits the highest level of model resilience and consistency.

The re-estimated indirect channel model RII moderation between FD and SD in Column (2) shows that the sustainable development coefficient value is (0.818) at 1% significance level. The independent variable, FD has positive impacts sustainable development with coefficient value (5.311) but not significant. The moderating composite of RII has negative coefficient value with (-0.115) at 5% significance level. Moreover, the interaction term FD*RII shows the positive coefficient value with (0.102) but not significant. It shows that 1% change increase in interaction term FD*RII will 0.102% increase the sustainable

development in BRI countries over the period of 2005 to 2020, similar to the main indirect channel results.

The results are supported by Zafar et al. (2021) they found that regional integration is favorably influences the economic development. So, regional integration boosts the financial development in developing countries and helps to achieve sustainable development. The findings are consistent with (H. M. Nguyen et al., 2019), they found that economic integration substantially and optimistically contributed to the economic development of Vietnam. So, regional integration boosts the financial development in developing countries and helps to achieve sustainable development.

So, Institutional Quality (IQ-ICRG) is positively and significantly contributed to the sustainable development with coefficient value (3.268) at 1% significance level in the robust check model. It means that 1% change increase in the IQ (ICRG) will increase 3.268% of sustainable development which is similar to Institutional Quality (WDI) of direct and indirect channel models. While APL negatively influences the sustainable development but not significant. The control variable results are similar to the main indirect channel of moderating model.

Column 3 of Table 4.8.1 lists the robust regression results from the investigation. According to the results of the RII moderation between FD and SD, the value of the SD lags coefficient is positive at 1% significance level, which is similar to the direct and indirect channel models. The independent variable, FD has an optimistic impact on SD but not significant. The moderating composite of RII has negative impact on SD at 10% significance level. Moreover, the interaction term FD*RII shows the positive coefficient value with (0.082) but not significant. It shows that 1% change increase in interaction term FD*RII will 0.082%

increase the sustainable development in BRI countries over the period of 2005 to 2020, which is similar to the main and robust 1 indirect channel model.

Additionally, the CAB Robust variable is used in Column 3 as a control variable, while all other variables are similar to the Main and Robust 1 models of indirect channel. The CAB is positive and significantly influencing the sustainable development at 10% significance level. The results are supported by Sanni et al. (2019), they found that current account balance has relationship with real gross domestic product (GDP) growth in long run. Due to real GDP growth and the current account balance have a positive connection, a rise in real GDP growth will result in a better current account balance. The results are consistent with the study of Aydın et al. (2016), who found that the projected deficit threshold is 4% for economic growth, and any current account deficit ratio above this threshold negatively influences the economic growth, whereas any rate less than this threshold has a favorable impact. The cross-sectional dependence of the static two-step system indirect channel GMM was confirmed using the regression fixed effect, standard error estimators. The two-step sys-GMM indirect channel's primary model's findings are generally validated by alternate variables regression results.

Table 4.8.1 Moderating Effect FD*RII Results of two-step system GMM

Dependent variable: SD	(1) Final Model of Two-step System GMM	(2) Robust 1	(3) Robust 2
L. Sustainable Development	0.863***	0.818***	0.812***
	(0.027)	(0.017)	(0.019)
Financial Development (FD)	8.392	5.311	8.367
	(10.778)	(11.349)	(10.870)
Regional integration Index	-0.151***	-0.115**	-0.105*

	(0.048)	(0.058)	(0.059)
FD*RII	0.157	0.102	0.082
	(0.141)	(0.146)	(0.145)
IQ (WDI)	2.617***		
	(0.698)		
IQ (ICRG)		3.268***	3.314***
		(0.774)	(0.764)
Earning Population (APL)	-0.168	-0.269	-0.304
	(0.104)	(0.111)	(0.106)
Inflation rate	0.158***	0.114**	0.125**
	(0.048)	(0.053)	(0.051)
Exchange Rate	0.001	0.001	0.001
	(0.001)	(0.001)	(0.001)
Unemployment	-0.004	-0.031	-0.043
	(0.058)	(0.039)	(0.038)
Current Account Balance-Robust			0.010*
			(0.009)
Constant	15.110**	22.667***	23.682***
	(7.342)	(8.137)	(8.006)
Observations	960	960	960

AR1	-4.081	-4.025	-3.998
P-value	4.48e-05	5.70e-05	6.38e-05
AR2	1.939	2.150	2.134
P-value	0.0525	0.316	0.328
Sargan test	83.00	84.08	83.93
Hansen test	38.47	42.29	43.22
P-value	0.274	0.291	0.258
Instruments (J-stat.)	58	62	63
Wald CHI2 test	34134	48364	68198
P-value	0	0	0
Groups	64	64	64

Standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1 (Roodman, 2009 xtabond2 command, two step orthogonal)

Table 4.8.2 shows the regional integration index moderation between institutional quality IQ-WDI and sustainable development by using the GMM dynamic two-step system model. The model is expanded further with interaction term of IQ-WDI and RII. So, the final results of GMM dynamic two-step system model are demonstrated in column (1) with the support of Wald test and two-step Sys-GMM criteria. The results of RII moderation between IQ-WDI and SD shows that dependent variable such as SD lags coefficient value is positive (0.838) at 1% significance level which indicates the sustainable development in dynamic nature. It shows that at a 1% significance level, an increase of 1% in the IQ-WDI will result in an increase of 83.8% in sustainable development of BRI countries. The independent variable, IQ-WDI has a negative coefficient value with (-1.942) but not significant.

The moderating composite of RII also has negative coefficient value with (-0.079) at 10% significance level. It means that 1% change increase in RII will -0.079% hurts the

sustainable development at 10 % significance level. Moreover, the interaction term IQ-WDI*RII shows the positive coefficient value with (0.069) at 5% significance level. It means that 1% change increase in interaction term IQ-WDI*RII will 0.069% increase the sustainable development in BRI countries over the period of 2005 to 2020. They results are consistent with (Bong & Premaratne, 2018), who found that regional integration substantially influences the economic growth. The author suggests that public institutions should endeavor to eliminate corruption and stabilize macroeconomic and political stability as boosting international trade among member nations to accelerate regional integration and economic development in the regions. So, regional integration boosts the institutional quality in developing economies and contributes to attain sustainable development of BRI countries over the period of 2005 to 2020. The finding are supported by Xu et al. (2021) they reveals that Regional integration and Institutional Governance positively influences the economic development.

Beside that other independent variable such as financial development, FD has positive and significant value with (13.280) at 1% significance level. Another, earning population (APL) has a negative impact with (-0.058) value but not significant. Furthermore, control variables such as inflation rate has a positive and significant value (0.128) at 1% significance level which shows that it positively influences the SD in BRI countries. Exchange Rate has no impact while unemployment has negative influence with (-0.057) value but both are not significant.

The findings of all diagnostic tests for the indirect channel model are listed in Column 1 of Table 4.8.2. The different diagnostic tests executed indirect channel model residuals satisfy the needed assessment assumptions and certify the accurate inference and validation of findings. The results demonstrate that AR1 is less than 5% in the first-order difference which confirms that there is no serial correlation and zero autocorrelation in the testes model. Moreover, for second-order difference, the AR2 is higher than 5% and confirms that indirect

channel model two-step system GMM is appropriate estimation technique for this study's sample because T (16) is less than N (64). In the Wald-Chi-square test model, the dependent, independent, and control variables are all statistically significant.

Furthermore, the indirect channel model fits the process in Column 1 according to the Wald test and Chi-square test, which has a p-value at 1% significant level. Additionally, the Column 1 indicates that the Sargan value is 77.43 and Hansen value is 38.44 with a p-value of 0.275. Extreme identification of constraints appears to enhance the instrument's reliability while contradicting the null hypothesis, according to Hansen and Sargan studies. To summarize the diagnostic test results achieved all the needed assumptions of assessment by confirming the consistency and accuracy of the applied approach, as shown in Table 4.8.2.

The robustness testing validates the results of indirect channel of RII moderation between IQ-WDI and SD as shown in Table 4.8.2, columns 2. Foremost, the outcomes' accuracy was verified by adding the new variable Current Account Balance (Piñeiro-Chousa et al.) and re-analyzing by using the same procedure of Column (1). Table 4.8.2, Column 2 of the appropriate indirect channel robustness model of the two-step system GMM displays all diagnostic test results. Therefore, Column 2 displays the results of various diagnostic tests performed on the estimated residual of the indirect channel model, including AR1, AR2, Wald-Chi-square, Hansen, and Sargan tests. So, the applied model ensures the accurate inference and is up to the mark. Therefore, the evaluated outcomes show that the indirect channel model is reliable which meets all the assumptions and shows the paramount model consistency of robustness.

The re-estimated indirect channel model GI moderation between IQ-WDI and SD in Column (2) shows that the sustainable development coefficient value is (0.845) at 1% significance level. Institutional Quality (IQ-WDI) has a negative coefficient value (-2.517) but

not significant in the robust check model. It means that 1% change increase in the IQ-WDI will hurt -2.517% of sustainable development which is similar to Institutional Quality-WDI of indirect channel models. The moderating composite of RII has negative coefficient value with (-0.083) at 10% significance level. Moreover, the interaction term IQ-WDI*RII shows the positive coefficient value with (0.078) at 1% significance level. It shows that 1% change increase in interaction term IQ-WDI*RII will 0.078% increase the sustainable development in BRI countries over the period of 2005 to 2020, similar to the main indirect channel results.

So, regional integration boosts the institutional quality in developing economies and contributes to attains sustainable development. So, the independent variable, FD has positive influence on sustainable development with coefficient value (15.029) at 1% significance level, similar to the main direct and indirect channel model. While APL negatively influences the sustainable development but not significant which is similar to the main indirect channel model. The control variable results are similar to the main indirect channel of moderating model.

Table 4.8.2 Moderating Effect IQ*RII Results of two-step system GMM

Dependent variable: SD	(1) Final Model of Two-step System GMM	(2) Robust 1
L. Sustainable Development	0.838***	0.845***
	(0.026)	(0.030)
Financial Development (FD)	13.280***	15.029***
	(4.469)	(5.470)
IQ (WDI)	-1.942	-2.517
	(1.653)	(1.794)

Regional integration	-0.079*	-0.083*
	(0.046)	(0.049)
IQ (WDI)*RII	0.069**	0.078***
	(0.027)	(0.030)
Earning Population (APL)	-0.058	-0.026
	(0.107)	(0.113)
Inflation rate	0.128***	0.143***
	(0.038)	(0.046)
Exchange Rate	0.000	0.000
	(0.000)	(0.000)
Unemployment	-0.057	-0.051
	(0.043)	(0.047)
Current Account Balance-Robust		-0.007
		(0.012)
Constant	5.462	2.822
	(7.669)	(8.310)
Observations	960	960
AR1	-4.020	-4.022
P-value	5.82e-05	5.77e-05
AR2	1.984	1.962
P-value	0.472	0.497
Sargan test	77.43	75.64
Hansen test	38.44	37.54
P-value	0.275	0.269
Instruments (J-stat.)	58	58

Wald CHI2 test	27851	29002
P-value	0	0
Groups	64	64

Standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1 (Roodman, 2009 xtabond2 command, two step orthogonal)

Table 4.8.3 shows the regional integration index moderation between earning population (APL) and sustainable development by using the GMM dynamic two-step system model. The interaction term between APL and RII significantly expands the model. So, the final results of GMM dynamic two-step system model are demonstrated in column (1) with the support of Wald test and two-step Sys-GMM criteria. The results of RII moderation between APL and SD shows that dependent variable such as SD lags coefficient value is positive (0.870) at 1% significance level which indicates the sustainable development of BRI countries is in dynamic nature. It shows that 1% change increase in APL will increase 87.0% of sustainable development at 1 % significance level.

The independent variable, APL has a positive coefficient value with (0.543) at 1% significance level. According to Z. Liu et al. (2022) population aging is linked with reduction in workforce size, savings, productivity, and increase in government consumption. On the other hand, population characteristics change has positive correlation because of improved workforce size and economic development which raised savings and investment (Z. Liu et al., 2022). The moderating composite of RII also has a positive coefficient value with (0.561) at % significance level. It means that 1% change increase in GI will 0.561% increase sustainable development at 1% significance level.

Moreover, the interaction term APL*RII shows the negative coefficient value with (-0.010) but not significant. It shows that 1% change increase in interaction term APL*RII will -0.010% hurt the sustainable development in BRI countries over the period of 2005 to 2020.

The findings are supported by the study of (Pham & Vo, 2019) they reveal that higher young people dependency share (14 years or younger) negatively influences the economic growth in long run for 84 developing economies while old dependency share (65 years old or above) is positive in long run towards economic progress. So, regional integration and earning population will boost the sustainable development individually but their interaction not as such contributed in developing countries to achieve sustainable development.

Along with other independent variable such as financial development, FD has positive and significant value with (11.348) at 1% significance level. Another, institutional quality (IQ-WDI) has a positive impact with (1.307) value at 10% significance level. Furthermore, control variables such as inflation rate has a positive and significant value (0.081) at 5% significance level which shows that it positively influences the SD in BRI countries. Exchange Rate and unemployment has negative influence on sustainable development.

The findings of all diagnostic tests for the indirect channel model are listed in Column 1 of Table 4.8.3, The different diagnostic tests executed indirect channel model residuals satisfy the needed assessment assumptions and certify the accurate inference and validation of findings. The results demonstrate that AR1 is less than 5% in the first-order difference which confirms that there is no serial correlation and zero autocorrelation in the testes model.

Moreover, for second-order difference, the AR2 is higher than 5% and confirms that indirect channel model two-step system GMM is appropriate estimation technique for this study's sample because T (16) is less than N (64). All the dependent, independent and control variables are significant in the Wald–Chi-square test model. Furthermore, the Wald test, Chi-square test has a p-value at 1% significance level which indicates that the indirect channel model is fit for procedure in Column 1. Additionally, the Column 1 indicates that the Sargan value is 75.98 and Hansen value is 38.26 with a p-value of 0.282. Extreme identification of constraints appears to enhance the instrument's dependability while contradicting the null

hypothesis, according to Hansen and Sargan studies. To summarize the diagnostic test results achieved all the needed assumptions of assessment by confirming the consistency and accuracy of the applied approach, as shown in Table 4.8.3.

The robustness testing validates the results of indirect channel of RII moderation between APL and SD as shown in Table 4.8.3, columns 2. Foremost, the outcomes' accuracy was verified by adding the new variable Current Account Balance (Piñeiro-Chousa et al.) and re-analyzing by using the same procedure of Column (1). The re-estimated indirect channel model RII moderation between APL and SD in Column (2) shows that the sustainable development coefficient value is (0.869) at 1% significance level. Earning population APL has a positive coefficient value (0.529) at 5% significance level in the indirect channel robust check model. It means that 1% change increase in the APL will 0.529% increases sustainable development of BRI countries, which is similar to earning population of indirect channel models. The moderating composite of RII has a positive coefficient value with (0.548) at 1% significance level.

Moreover, the interaction term APL*RII shows the negative coefficient value with (-0.009) at 1% significance level. It shows that 1% change increase in interaction term APL*RII will -0.009% hurt the sustainable development in BRI countries over the period of 2005 to 2020, similar to the main indirect channel results. So, regional integration and earning population will boost the sustainable development individually but their interaction not as such contributed in developing countries to achieve sustainable development.

Besides other independent variable, FD has positive influence on sustainable development with coefficient value (11.156) at 5% significance level, similar to the main indirect channel model. While IQ-WDI positively influences the sustainable development at 10% significance level, which is similar to the main indirect channel model. The control variable results are similar to the main indirect channel of moderating model.

The robust CAB in Column (2) is positive but not significant. The results are consistent with the Mugo et al. (2021), they observed that current account deficits significantly and positively influence the economic growth. The results are supported by Sanni et al. (2019), they reveals that current account balance has relationship with real gross domestic product (GDP) growth in long run. Due to real GDP growth and the current account balance have a positive connection, a rise in real GDP growth will result in a better current account balance.

The appropriate indirect channel robustness model of the two-step system GMM includes all diagnostic test results in Table 4.8.3, Column 2. As a result, Column 2 displays the results of various diagnostic tests performed on the estimated residual of the indirect channel model, including AR1, AR2, Wald-Chi-square, Hansen, and Sargan tests. So, the applied model ensures the accurate inference and is up to the mark. Therefore, the evaluated outcomes show that the indirect channel model is reliable which meets all the assumptions and shows the paramount model consistency of robustness.

Table 4.8.3 Moderating Effect APL*RII Results of two-step system GMM

Dependent variable: SD	(1) Final Model of Two-step System GMM	(2) Robust 1
L. Sustainable Development	0.870***	0.869***
	(0.023)	(0.026)
Financial Development (FD)	11.348***	11.156**
	(4.199)	(4.514)
IQ (WDI)	1.307*	1.339*
	(0.733)	(0.749)
Earning Population (APL)	0.543***	0.529**

	(0.197)	(0.209)
Regional integration index	0.561***	0.548***
	(0.199)	(0.202)
APL*RII	-0.010***	-0.009***
	(0.003)	(0.003)
Inflation rate	0.081**	0.081**
	(0.038)	(0.039)
Exchange Rate	-0.000	-0.000
	(0.000)	(0.000)
Unemployment	-0.077*	-0.078*
	(0.045)	(0.046)
Current Account Balance-Robust		0.001
		(0.009)
Constant	-33.439***	-32.554**
	(12.425)	(13.439)
Observations	960	960
AR1	-4.077	-4.055
P-value	4.57e-05	5.01e-05
AR2	2.088	2.082
P-value	0.368	0.373
Sargan test	75.98	75.46
Hansen test	38.26	38.02
P-value	0.282	0.251
Instruments (J-stat.)	58	58
Wald CHI2 test	26345	26589

P-value	0	0
Groups	64	64

Standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1 (Roodman, 2009 xtabond2 command, two step orthogonal)

4.9 Test for Cointegration Analysis as Robust

The Westerlund Test for Cointegration Analysis shown in table 9.1, was used to evaluate the robustness of cointegration across several models. The variance ratio showed substantial evidence of cointegration at p<0.01, which shows a in strong evidence of cointegration in Model 1, so it is being accepted. Similarly, the variance ratios in Models 2, 3, and 4 supported the hypothesis of cointegration across all panels, which was also accepted, even at lower significance levels (p<0.05 and p<0.1). This suggests that, despite minor changes in the model specifications, the relationship between the variables under study is long-term and stable.

Table 4.9.1 Westerlund Test for Cointegration Analysis as Robust

Detail	Value	P-value	Accepted/Rejected
Westerlund Test for Cointegration			
Direct Model 1			
Variance ratio	12.5549***	0.0000	Ha: All panels are cointegrated (Accepted).
Model 2 FD*GI			
Variance ratio	1.5354*	0.0623	Ha: All panels are cointegrated (Accepted).
Model 3 GOV*GI			
Variance ratio	-1.9465**	0.0258	Ha: All panels are cointegrated (Accepted).
Model 4 APL*GI			
Variance ratio	-1.8989**	0.0288	Ha: All panels are cointegrated (Accepted).

Standard errors in parentheses, *** p<0.01 (1%), ** p<0.05 (5%), * p<0.1 (10%)

The robustness of cointegration across several models was evaluated using the Pedroni Test for Cointegration Analysis, shown in table 9.2. The modified variance ratios in Models 2, 3, and 4 as well as the Direct Channel Model were all very significant (p<0.01), providing compelling evidence of cointegration, which was approved. Furthermore, all three statistics—the Augmented Dickey-Fuller t, the Phillips-Perron t, and the Modified Phillips-Perron t—were highly significant (p<0.01), providing additional evidence for the cointegration theory across all panels. This model-to-model consistency points to a long-term, steady link between the variables being examined. Additional detail regarding the technique, such as the number of panels, average number of periods, lag specifications, and other pertinent characteristics, is provided in the key notes.

Table 4.9.2 Pedroni Test for Cointegration Analysis as Robust

Detail	Value	P-value	Accepted/Rejected
Direct Channel Model			
Modified Variance Ratio	-8.5644***	0.0000	
Modified Phillips-Perron t	8.0213***	0.0000	
Phillips-Perron t	-18.6209 ***	0.0000	Ha: All panels are cointegrated (Accepted).
Augmented Dickey-Fuller t	-18.4844***	0.0000	
Model 2 FD*GI			
Modified Variance Ratio	-9.8862***	0.0000	
Modified Phillips-Perron t	9.8928***	0.0000	Ha: All panels are cointegrated (Accepted).
Phillips-Perron t	-18.0264***	0.0000	

Augmented Dickey-Fuller t	-16.8008***	0.0000	
	Model 3 GOV*GI		
Modified Variance Ratio	-10.1811***	0.0000	
Modified Phillips-Perron t	9.7214***	0.0000	Ha: All panels are cointegrated
Phillips-Perron t	-17.7642***	0.0000	(Accepted).
Augmented Dickey-Fuller t	-17.2801***	0.0000	
	Model 4 APL*GI		
Modified Variance Ratio	-12.3134***	0.0000	
Modified Phillips-Perron t	10.6811***	0.0000	Ha: All panels are cointegrated
Phillips-Perron t	-13.4072***	0.0000	(Accepted).
Augmented Dickey-Fuller t	-13.8678***	0.0000	

Key Notes:

Number of Panels = 64	Cointegrating Vector: Panel Specific
Panel Means: Included	
Avg. Number of Periods = 16	Kernel: Bartlett
Augmented Lags: 1 (AIC)	Time trend: Included
Cross-sectional Means Removed	Lags: 2.00 (Newey-West)
	AR parameter: is for all panels

4.10 Discussion and Comparison of Results

This study used the two-way GMM estimation for One Belt & One Road 64 Countries in table 4.7.1 Their results indicated that an independent variable such as financial development (FD) coefficient is significant and positive at 1% significance level in main model. It means that 1% change increase in FD will increase 11.376% of sustainable development of BRI countries. In robust check model FD also positive and significantly contributed to the sustainable development of BRI countries.

These results are supported by Bakar et al. (2020), they observed that financial sector has robust favorable effect on economic progress by using the GMM estimations. Khemani and Kumar (2022) reveal that financial development positively contributed to achievement of Sustainable development goals. Murad and Idewele (2017) argued that financial development provides a great sense of investment decisions and savings regarding the saving mobilization, resource mobilization and trade adjustment. Therefore, all of these factors primarily contributed to the financial operations of the country in order to encourage sustainable development of BRI countries. Both (Filiz-Ozbay et al., 2015; Ullah, Pinglu, Ullah, & Hashmi, 2022) stated that a well-functioning financial system is required in poverty alleviation (financial inclusion) and reducing the other economic risks. Next independent variable, institutional quality (IQ-WDI) is significant and positive at 1% significance level which shows that 1% change increase in IQ will increase 2.88% of sustainable development of BRI countries. Similarly, IQ (ICRG) is positive and significantly influences the sustainable development in robust check model.

The findings are consistent with Beyene (2022) reveal that composite governance index positively and significantly influences the country's economic progress. The results are in line with Tran et al. (2021), they found that institutional quality is critical factor of economic development of Asian economies. Azam and Emirullah (2014) claimed that good governance

is noteworthy, they suggested that policymakers should prioritize minimizing endemic corruption and dealing with inflation when developing and executing macroeconomic and public policies. It is critical to go to the base of the problem in order to be most effective in combating corruption. Considering the results, they recommended that corruption should be controlled, and economies be made more transparent in order to get more benefits and accelerated the economic progress and advances.

The third and last independent variable earning population (APL) is negative but significant in main, robust check model. It means that 1% change increase in APL will decreases the sustainable development.

The findings are supported by Pham and Vo (2019) they observed that higher young people dependency share (14 years or younger) negatively influences the economic growth in long run for 84 developing economies. The findings are supported by Bawazir et al. (2020), they revealed that the old dependency ratio and all ages of the worker population's growth rate have a positive influence on economic growth, whereas the young dependency ratio has a negative influence on economic growth. According to Ven and Smits (2011), the changing population characteristics in the population causes variations in the demographic composition in different countries around the world. In addition, their research highlighted the realization of the age structure's significance towards economic progress in research conducted in late 1980s and early 1990s. They show that a decreasing child-to-youth ratio increase the opportunities for economic growth, lowering the dependence ratio and expanding the labor force.

Furthermore, the control variables findings from main and robust check model are similar. While it reveals that, inflation rate (INF) is positive and significant. Thus, 1% change increase in INF will be contributed to the sustainable development. The results are supported by the research of Lubbock et al. (2022) they found that inflation positively influences the

economic growth. The results are supported by Karki et al. (2020), their study findings are in the favor of the specific inflation threshold level which is appropriate for development. A high rate of inflation stifles economic growth. In today's environment, an economy with little or no growth is constantly tied to key challenges like poverty, poor welfare, and unemployment (Ayd, 2016). To ensure sustainable economic progress, each country's inflation thresholds must be determined (Omarova, 2020b). According to Arby and Ali (2017) the low rate of inflation is considered one of the indicators of macroeconomic stability and a lower inflation rate is linked with a stable economy (Gylfason & Herbertsson, 2001). With the passage of time, a widespread consensus develops that moderate inflation supports economic growth, contrasting with excessive prices, which can cause uncertainty and disrupt economic performance (Mubarik & Riazuddin, 2005).

Another control variable Exchange Rate (EXR) is positive and significant in all three models. It means that 1% change increase in EXR will boosts the sustainable development of BRI countries. The results are consistent with Kong (2021) who indicate that exchange rate appreciation helps to boost economic development. Exchange rate appreciation supports economic growth more effectively when the local currency's value is high, while exchange rate appreciation less effectively promotes economic growth when the local currency's value is low. The findings are supported by Morina et al. (2020) they found that lower level of exchange rate volatility contributed to the economic development.

Janus and Riera-Crichton (2015b) highlighted that there is negative relationship exist between real effective exchange rate instability and economic growth. J. O. Adeniran et al. (2014) reported that instable exchange rate impacted negative on economic progress. Petreski (2010) stated that a moderate fluctuation in exchange rate positively contributed to economic growth. Also, Babu et al. (2019) reported that there is an optimistic impact of moderate exchange rate variation on economic growth. Alagidede and Ibrahim (2017) found that

overvaluation of exchange rate appreciation damaged the path of economic development. So, normally the real exchange rate has favorable association with economic growth in developing states.

The third control variable, unemployment (UER) is negative and not significant in all three models. It shows that 1% change increase in the UER will hurts the sustainable development of BRI countries. The results are consistent with Hlongwane et al. (2021) who found that unemployment statistically insignificant and negatively influences economic progress. The findings are in line with the Conteh (2021), who found that unemployment negatively effects the economic growth. Prasetyo and Kistanti (2020) reported that sustainable economic development is critical in lowering the rate of unemployment. Another study highlights the lower rate of unemployment is the key factor to stimulates economic growth (Dodds & Hess, 2020).

Additionally, the CAB variable is used in Column 3 as a control variable in robust regression model, which is positive and significant at 10% significance level. It means that 1% change increase in CAB will helps sustainable development of BRI countries. The results are supported by (Mugo et al., 2021) they observed that current account deficits significantly and positively influence the economic growth. The results are supported by (Sanni et al., 2019) they found that current account balance has relationship with real gross domestic product (GDP) growth in long run.

Furthermore, regional integration playing a moderating role in between independent and dependent variables. The interaction term FD*RII has the positive coefficient value but not significant. It shows that 1% change increase in interaction term FD*RII will increase the sustainable development in BRI countries over the period of 2005 to 2020. The findings of A. Farooq et al. (2020) revealed that positive change in regional integration boosts economic growth in economies with an effective financial system. The outcomes are consistent with the

research of Zafar et al. (2019) they found that regional integration is favorably influences the economic development. So, regional integration boosts the financial development in developing countries and helps to achieve sustainable development of BRI countries.

Selvarajan and Ab-Rahim (2020) recommended that policymakers prioritize regional integration in their growth strategy. The deeper regional integration comprises to enable financial sector development and further trade connectivity and lowers the asymmetric knowledge through encouraging transparency in financial sector and reporting requirements. Financial integration is being inevitable due to China's BRI Initiatives world widely demands the critical undertaking of financial integration and strengthen the well-integrated financial sector. As a result, pursuing financial development and macroeconomic reorganization will necessitate more effort in order to reap the gain of financial integration regions, allowing long-term development to deliver significant policy lessons in BRI economies.

The interaction term IQ-WDI*RII has the positive coefficient value at 5% significance level. It shows that 1% change increase in interaction term IQ-WDI*RII will increase the sustainable development in BRI countries. So, regional integration boosts the institutional quality in developing economies and contributed to attain sustainable development. The findings are supported by the Xu et al. (2021) they observed that Regional integration and Institutional Governance positively influences the economic development. The results are consistent with Bong and Premaratne (2018), who show that regional integration substantially influences the economic growth. The author suggests that public institutions should endeavor to eliminate corruption and stabilize macroeconomic and political stability as boosting international trade among member nations to accelerate regional integration and economic development in the regions. So, regional integration boosts the institutional quality in developing countries and helps to achieve sustainable development of BRI countries.

The interaction term APL*RII has the negative coefficient value but not significant. It shows that 1% change increase in interaction term APL*RII will hurt the sustainable development in BRI countries. The findings are supported by the study of Pham and Vo (2019) they reveal that higher young people dependency share (14 years or younger) negatively influences the economic growth in long run for 84 developing economies while old dependency share (65 years old or above) is positive in long run towards economic progress. So, regional integration and earning population will boost the sustainable development individually but their interaction not as such contributed in developing countries to achieve sustainable development of BRI countries.

4.11 Summary of Results based on Hypothesis

The study's conclusions show that all alternative hypotheses are accepted at the initial difference and at all levels, but all null hypotheses about variables are rejected. Multicollinearity is not affected the results which is confirmed by VIF test outcomes. So, fundamental tests support the use of extensive analysis and estimating methodologies to establish the study's aims and research questions. Further two-step system GMM estimation and robust models are used in this study and their findings are validated. Shortly the results indicate that the sustainable development of sample BRI countries is on track.

Outcomes reveal that independent variables such as FD is positively and significantly contributed to the sustainable development of BRI member states. So, the results supported the H1 alternative hypothesis and rejected the null hypothesis. The findings are supported by the Bakar et al. (2020) ,they observed that financial sector has robust favorable effect on economic progress by using the GMM estimations. Also consistent with Bakar et al. (2020), they observed that financial development has positive relation with economic growth.

Next independent variable institutional quality (IQ-WDI and ICRG) both composites are positively and significantly boosted the sustainable development of BRI states. These results support the H2 alternative hypothesis and rejected the null hypothesis. The findings are consistent with (Beyene, 2022) who reveal that composite governance index positively and significantly influences the country's economic progress. The results are in line with Beyene (2022) they found that an important component of economic development is institutional quality.

The third and last independent variable earning population (APL) is negative but significantly influences the sustainable development of BRI states. So, the results rejected the null hypothesis and supported the H3 alternative hypothesis which is a positive relationship exist between the age 15 to 65 on sustainable development. The findings are supported by Pham and Vo (2019) they observed that higher young people dependency share (14 years or younger) negatively influences the economic growth in long run for 84 developing economies. The outcomes are in line with the research of Bawazir et al. (2020), they revealed that the old dependency ratio and all ages of the worker population's growth rate have a positive influence on economic growth, whereas the young dependency ratio has a negative influence on economic growth.

Regional integration being a moderating variable plays a significant role in between independent (FD, IQ, APL) and dependent variable. So, the results supported the H4 alternate hypothesis and rejected the null hypothesis. The results are in line with A. Farooq et al. (2020), who revealed that positive change in regional integration boosts economic growth in economies with well-educated employees and an effective financial system. They results are consistent with Bong and Premaratne (2018), who observed that regional integration substantially influences the economic growth. The findings are supported by study of Pham and Vo (2019)

they reveal that higher young people dependency share (14 years or younger) negatively influences the economic growth in long run for 84 developing economies while old dependency share (65 years old or above) is positive in long run towards economic progress.

On the other hand, Obere et al. (2013) discovered that regional integration greatly promoted economic progress. Also, findings are consistent with the research of Bong and Premaratne (2018) who found that regional integration substantially influences the economic growth. The findings are consistent with Ullah, Pinglu, Ullah and Hashmi (2021) regional integration's moderating role promoted sustainable development which is considered as an efficacious sustainable development for BRI economies.

Chapter 5

CONCLUSION, RECOMMENDATIONS, FUTURE OUTLOOKS

5.1 Conclusions of the dissertation

This study investigated the dynamic impact of financial development, institutional quality and earning population on sustainable development, with the moderating effect of regional integration along with controlling variable inflation, current account balance, exchange rate and unemployment on One Belt and One Road countries, from the period of 2005 to 2020. Because sustainable development is continuously gaining a huge attention from policy maker, academics, and industry representatives. Also, the sustainable development coupled with economic, social, and ecological fields to acquire the societal, technological, institutional, and political requirements of the world. The extended Solow standard economic growth model serves as the theoretical foundation.

Financial development strengthens economies' resilience and increases economic growth by ensuring effective resource allocation, mobilizing savings, promoting information sharing, and facilitating diversification and risk management. In addition, financial development encourages financial stability to soften the impact of shocks by profound and liquid financial systems as well as a variety of methods. Financial development boosts economic activity among level of income households by allowing them to take advantage of investment opportunities. In addition, financial development encourages poorer households to engage in entrepreneurial activity by offering easier credit access.

In today's globalized environment, institutional quality and sustainable development are inextricably intertwined. Good governance procedures allow international and national

investors to freely make decisions regarding investments, resulting in sustainable development. It also ensures that the civil society, private sector, nation, or non-nation performers are involved in decision-making process to promote accountability, transparency, the rule of law at all stages, and allows for competent managing of natural, human, financial and economic resources intending to achieve equitable and sustainable development.

This study utilizes panel data from the longest data set over the period 2005-2020 for 64 One Belt and One Road (OBOR) countries. Empirical research employing time series data and work with panel data regarding macroeconomics, finance, regional and international fields to back policy decisions. The popularity of panel data is because of advancement in scrutinizing it with software such as Stata, to do advanced computations. Due to its greater flexibility and efficiency this study uses a panel dataset. The dataset can discover and analyze exact statistical effects through the panel, which other methodologies cannot. Our panel data set comprises a wide sample of 64 nations spanning 16 years and panel data approaches improves the econometric estimations' efficiency which are more appropriate for assessing the factors affecting sustainable development.

This study used the cross-sectional dependence test and panel unit root test. Furthermore, the two-step system generalized methods of moments (GMM) is more appropriate and suitable methods to control the autocorrelation and ensure accuracy in inferences by taking lagged dependent variables, unattended panel heterogeneity, omitted factors bias, measurement's errors, and reducing endogeneity. Endogeneity is a significant problem with larger panel data such as the BRI countries in this study. Thus, using the panel data approach for testing with the two-step system GMM and robust is advantageous.

So, the findings of the study indicate that all null hypothesis regarding variables is rejected, and alternative hypothesis are accepted at first difference and all levels.

Multicollinearity is not affected the results which is confirmed by VIF test outcomes. In order to establish the scientific questions and study objectives, basic tests support the use of detailed analytical estimation methodologies. Shortly the results indicate that the sustainable development of sample BRI countries is on track.

Based on two-way GMM estimation for One Belt & One Road 64 Countries, their results indicated that an independent variable such as financial development (FD) coefficient is significant and positive at 1% significance level in main model. It means that 1% change increase in FD will increase 11.376% of sustainable development. In robust check model FD also positive and significantly contributed to the sustainable development. So, the results supported the H1 alternative hypothesis and rejected the null hypothesis. The financial development and advancement considered as critical means for achieving sustainable economic and financial systems in the BRI countries. As the economic and financial system are essential ingredients for the country's sustainable economic development and boosting living standards of both the public and private sectors. An effective financial system is a critical tool that fuels any economy's development worldwide.

Next independent variable, institutional quality (IQ-WDI) is significant and positive at 1% significance level which means that 1% change increase in IQ will increase 2.88% of sustainable development. Similarly, IQ (ICRG) is positive and significantly influences the sustainable development in robust check model. These results support the H2 alternative hypothesis and rejected the null hypothesis. Governance and sustainable development are reciprocally connected in globalized world. Good governance procedures allow domestic and global investors to freely take investment decisions that resulting in sustainable development. The accomplishment of sustainable development goals requires efficient sustainable development governance at all stages.

The third and last independent variable earning population (APL) is negative but significant in main, and robust check model. It means that 1% change increase in APL will decreases the sustainable development. So, the results rejected the null hypothesis and supported the H3 alternative hypothesis which is a positive relationship exist between the age 15 to 65 on sustainable development in BRI countries. From a societal standpoint, everyone should be able to maintain their existing lifestyle after superannuation or in elderly age, even if this is not reasonable given existing savings rates. Consequently, a large portion of the population relies on government support via a safety net that burdens upcoming generation. The working population age share group ranging from 16 to 64 considered as an element that supports sustainable development.

Moreover, the control variables findings from main and robust check model and in robust check model are similar. While it reveals that, inflation rate (INF) is positive and significant. Thus, 1% change increase in INF will be contributed to the sustainable development. Another control variable Exchange Rate (EXR) is positive and significant in all three models. It means that 1% change increase in EXR will boosts the sustainable development. The third control variable, unemployment (UER) is negative and not significant in all three models. It shows that 1% change increase in the UER will hurts the sustainable development. Additionally, the CAB variable is used in Column 3 as a control variable in robust model, which is positive and significant at 10% significance level. It means that 1% change increase in CAB will helps sustainable development.

Furthermore, the regional integration played as moderating role in between independent and dependent variables. The interaction term FD*RII in table 4.8.1, shows the positive coefficient value but not significant. It shows that 1% change increase in interaction term FD*RII will increase the sustainable development in BRI countries. Table 4.8.2 demonstrate that the interaction term IQ-WDI*RII shows the positive coefficient value at 5% significance

level. It shows that 1% change increase in interaction term IQ-WDI*RII will increase the sustainable development in BRI countries. The interaction term APL*RII in table 4.8.3, shows the negative coefficient value but not significant. It indicates that 1% change increase in interaction term APL*RII will hurt the sustainable development in BRI countries. So, overall regional integration being a moderating variable plays a significant role in between independent (FD, IQ, APL) and dependent variable. The results supported the H4 alternate hypothesis and rejected the null hypothesis.

The SDGs will only be achieved if financial resources are mobilized, and advanced technology are transferred to underdeveloped countries. To make this possible, the government must play a vital role, which requires both the creation of rules and regulations as well as financial assistance. And the dependency ratio of population should be minimum because large populations depend on the government for support in delivering fundamental services like healthcare and infrastructure, which poses a financial burden on future generations. According to the life cycle theory of consumption, a growing population with unequal income will cause the national saving rate to decline, which will result in an unstable path toward sustainable development. While, earning population contributed to the economic growth and leads the country on stable path towards sustainable development. On the other hand, regional integration also playing a critical role of moderation between dependent and independent variables. It boosts the independent variables performance that eventually boosts the sustainable development.

With an unexplored collection of factors such adjusted net savings, particle emission damage index of the World Bank for sustainable development, financial development, institutional quality, and age structure, this study adds to the body of knowledge and the innovative concept in numerous ways. Additionally, by using the most up-to-date empirical two-step system GMM technique validation through alternate variables, it emphasizes other

socioeconomic variables such as inflation, current account balance, exchange rate, and unemployment as control variables concerned with reducing the regional integration of Belt and Road countries.

5.2 Contribution of the study

This study empirically explored the impact of financial development, institutional quality and earning population on sustainable development by controlling the effect of inflation, current account balance, real exchange rate and unemployment with the moderating effect of regional integration on the most emerging and developing countries "One Belt and One Road" (OBOR) on the longest available data set from the period of 2005-2020 by applying the most robust econometric estimation technique system GMM for panel data. In addition, upon the above premises, the big question in literature seeks the answer, how institution quality enhances the development by considering environment and natural resources.

This research will help countries in policy formation for digitalized development along with environmental quality in presence of good governance. As per my best, this study is unique both theoretically and empirically.

First, it fills the literature gap by performing analysis on longest available data set of the most important region of world (OBOR) in terms of GDP, development, infrastructure, and economic corridor. Results imply that the breadth and BRI interconnectivity of financial and institutional systems have a significant power to promote human progress, bridge the digital divide, and create sustainable knowledge-based societies. In BRI countries, there are more people who live in poverty. In order to increase per capita income and sustain development over the future years, better regional strategies are therefore needed for financial inclusion and poverty reduction. The results support theories of economic and development. Promoting regional connectivity through regional integration is the key component. It brings creative

production techniques, fresh knowledge and skills, and cutting-edge technology, which aids in luring foreign investors for finance. To promote a sustainable and economic development, governments should enact international development strategies and legislation.

This study used all the six proxies of governance developed by WGI to see their impact on economic indicators and sustainable development. And found that Institutional quality is crucial for shaping global financial and economic developments towards growth and giving an economy an incentive structure. Therefore, development stagnation or deterioration suggest that institutional quality needs to be stressed more in Belt and Road countries. Impoverished nations, particularly those participating in the Belt and Road Initiative that are poor or have weak institutional systems, needs to address the negative impact of insufficient institutional quality has on income distribution.

Important policy implications for sustainable and balanced growth can be drawn from the current study's findings. From a social standpoint, the study contends that everyone must maintain their current living conditions and access to health care facilities beyond retirement or old age. The current saving rates, though, this would not be possible. Because of this, large populations depend on the government for support in delivering fundamental services like healthcare and infrastructure, which poses a financial burden on future generations. According to the life cycle theory of consumption, a growing population with unequal income will cause the national saving rate to decline, which will result in an unstable path toward sustainable development. As more people enter their dissolving years, the cost of providing healthcare for the elderly rises. The reliance costs of young people and the elderly are typically reversed, with the former increasing with a replacement fertility strategy while the latter decreasing throughout the fertility transition.

A nation pursuing a prospective macroeconomic goal may see major policy repercussions from sustainable development. It provides clear, simple measures for gauging how sustainable a nation's spending plans are, which is advantageous to national decision-makers. The sole indicator that can assist policymakers is sustainability since it provides a valuable context for tracking the development of a nation's resources and coordinating investments across diverse capital doings. Regional integration is the core component of the economic cycle according to the theories of sustainable development, economic theory (Solow Neoclassical Growth), regionalization development, and comparative public administration. Consequently, established and developing nations should grant investments and bilateral contracts to underperforming and underdeveloped nations in order to strengthen their economic structures by making investments in those nations and preserving the financial inclusion and soundness systems in these unstable nations.

This study performed series of econometric test; CIPS & CADF panel root test for panel cointegration modeling and variables incorporations, OLS, Fixed effect model, GMM model to produce robust, consistent, and reliable results. All this way study add value in existing research and help practically development banks like Asian development to design policy at regional level.

5.3 Limitations and Future Work of the study

Based on the data's availability, the study's scope was restricted to 64 nations. Adjusted net savings as a measure of sustainable development includes public sector education spending and the inclusion of private sector and R&D spending may prove to be a very worthwhile addition to the overall index. With an unexplored collection of variables and an expanded version of the Solow standard model of economic growth for sustainable development, this research adds to the original idea in this field and the Belt and Road Countries in several ways.

Based on scientific research questions of financial development, institutional quality, population characteristics, and regional integration, this study pinpoints and explores the factors that influence the sustainable development of a regionally integrated country sample from the BRI initiative in order to advance existing knowledge, theory, and implications in this field. Future work may consider the financial technology, financial inclusion and sustainability at global integration level.

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