



HEC RECOGNIZED JOURNAL
IN “Y” CATEGORY

JOURNAL OF
BUSINESS
STRATEGIES

FACULTY OF MANAGEMENT SCIENCES

#38



Greenwich University

PAKISTAN

www.greenwich.edu.pk

VOL.19, NO.2, DECEMBER 2025
ISSUE DOI:10.29270/JBS.2025.19.2(38)

ISSN: 1993–5765
e-ISSN: 2521–2540

JOURNAL OF BUSINESS STRATEGIES



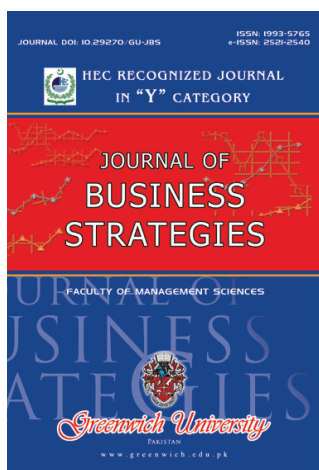
Greenwich University

PAKISTAN

w w w . g r e e n w i c h . e d u . p k

Journal of Business Strategies, Vol.19(2)
December 2025

Journal of Business Strategies



ISSN: 1993-5765 (Print)
ISSN: 2521-2540 (Online)

Frequency: 2 Issues per year

Journal of Business Strategies (JBS) is an international peer-reviewed, academic research journal published bi-annually by the Faculty of Management Sciences, Greenwich University Pakistan. The journal focuses on various business topics which cover Business Marketing, Management, Banking & Finance, Economics, Accounting, HR, Labor Laws and other inter-related subjects.

Journal of Business Strategies provides an academic platform for business professionals and research scholars to contribute their original, unpublished and novel researches in the diverse business fields stated above. *Journal of Business Strategies* carries original, full-length research papers that reflect latest researches and developments in both theoretical and practical aspects of national and international business studies.



Available at:



Research Papers by [Journal of Business Strategies](#) is licensed under a Creative Commons Attribution-NonCommercial 4.0 International License.

Based on a work at <http://www.greenwich.edu.pk/business-strategies/>.

Permissions beyond the scope of this license may be available at <http://www.greenwich.edu.pk/>.

Designed & Composed by Saeed Ahmed

Editorial Board

PATRON

Dr. Seema Mughal

Tamgah-e-Imtiaz
Vice-Chancellor
Greenwich University
Pakistan

EDITOR-IN-CHIEF

Prof. Dr. A. Q. Mughal

Sitara-i-Imtiaz
Research Professor
Greenwich University, Pakistan
aqmughal@greenwich.edu.pk

EDITOR

Prof. Dr. Shafiq ur Rehman

Greenwich University
Pakistan
drshafiq@greenwich.edu.pk

ASSOCIATE EDITOR

Dr. Arifa Saeed

Greenwich University

ASSISTANT EDITOR

Ph.D Scholar Rafia Khan

Greenwich University

MANAGING EDITORS

Dr. Rab Nawaz

Director Quality Assurance
Greenwich University, Pakistan
rub@greenwich.edu.pk

Editorial Board Details

Dr. Nooreen Mujahid

Professor

*Director, Applied Economics Research
Centre, University of Karachi, Karachi.*

Dr. Atif Hassan

Dean

*Hashoo School of Hospitality
Management, Lahore,
Affiliated of Sheffield Hallam
University, United Kingdom.*

Dr. Rizwana Bashir

Professor/Dean

*Management & Social Sciences
Lahore Garrison University
Lahore.*

Dr. Iffat Sabir Chaudhry

Assistant Professor

*Al Ain University
United Arab Emirates.*

Advisory Board Details

Dr. Nirmal De Silva

*Associate Professor
International Business
Management Consultant
Sri Lanka.*

Dr. Syed Ammad Ali

*Assistant Professor
Applied Economics Research Center
University of Karachi
Karachi.*

Dr. Rizwan Thair

*Assistant Professor
McMaster University, Hamilton,
Ontario, Canada.*

Dr. Farooq Mughal

*Associate Professor
School of Management, University of
Bath, Claverton, Down, BA2 7AY, Bath.*

Editorial Note

Current Economy And Business Situation Globally

The ultimate goals of international economists remain clear: to improve current economy and business situation globally after february 2026: (conflict in the middle east)

As of early 2026, the global economy is showing resilience but is experiencing slow, uneven growth and is facing renewed volatility due to intensifying geopolitical conflicts and energy market shocks.

Global output is projected to slow in 2026, dropping below 2025 levels, weighed down by low investment structural headwinds, and trade disruptions.

Conflict in the middle east has disrupted energy supplies, with brent crude prices recently spiking. This has triggered new energy crises, fuel price hikes, and shortages in some regions.while headline inflation is declining, core inflation remains sticky. Monetary policy easing is occurring in some areas, but tightening financial conditions remain a risk for developing economies with high debt.

The us economy is projected to slow. Growth in the euro area remains low.

Heightened tariffs and fragmented trade policies continue to drive economic uncertainty and raise shipping costs.

Despite general economic weakness, a technology-driven boom continues to support sectors, particularly in ai and digital services. New geopolitical tensions are forcing, renewed focus on supply chain resilience and security.

Global trade is experiencing volatility, with rising trade frictions in 2026 threatening to slow growth.

Elevated oil prices and persistent supply chain issues have brought renewed concerns of a potential global recession. The ongoing war in the middle east poses a significant risk to global trade routes and oil supply.

High debt servicing costs are hindering growth, particularly for low-income countries.

Governments face tight fiscal space, limiting their ability to stimulate growth.

The global economy is entering a "new era" characterized by lower potential growth and higher uncertainty, requiring enhanced policy coordination to avoid further slowdowns.

Finally, as we present this fourth issue of the journal of business strategies after securing The “y” category from hec pakistan, we reaffirm our commitment to publishing research that engages with these critical questions. We trust our readers will find in this volume fresh insights into the intersection of economics, society, and justice.

Professor Dr. Shafiq ur Rehman
Editor
Journal of Business Strategies
Greenwich University
Pakistan

Table of Content

	Page No.
Asia’s New Economic Powerhouse: India’s Rise And Its Implications For China’s	01-28
<i>Abdul Samad, Sabeen Azam, Erum Naz</i>	
Non-Farm Work Decisions In Rural Areas Of Pakistan: Motivation, Magnitude And Profitability Of Non-Farm Work	29-53
<i>Mr. Sohail Javed, Dr. Ambreen Fatima, Dr. Fouzia Sohail</i>	
Catalysts Of Inflation In Pakistan: Twin Deficit Or Money Supply	54-78
<i>Raza Ali Khan, Talha Ahmed Siddiqui, Syeda Zuimah Wasim</i>	
Link Of Energy Consumption, Fdi, Urbanization And Gdp With Carbon Emissions: A Time Series Analysis Of Pakistan	79-105
<i>Syed Mujtaba Ali Nizami, Noman Saaed and Khurram Iftikhar</i>	
The Long-Run Relationship Between Macroeconomic Factors And Stock Prices: A Comparative Study Between Conventional And Islamic Indices	106-122
<i>Muhammad Waqas, Dr. Umar Sadiq</i>	
Pakistan's Wheat Paradox: Self-Sufficiency Amidst Rising Imports And Policy Challenges	123-139
<i>Farahnaz Gilal, Jam Ghulam Murtaza Sahito, Habibullah Magsi</i>	
Green Hrm And Organizational Citizenship Behavior For Sustainable Economic Performance: A Case From An Emerging Economy	140-177
<i>Dr. Mustaghis ur Rahman , Muhammad Faraz</i>	

ASIA'S NEW ECONOMIC POWERHOUSE: INDIA'S RISE AND ITS IMPLICATIONS FOR CHINA'S

Dominance

Abdul Samad

(Master's Student at Faculty of History and Political Studies, Tomsk State University, Tomsk, Russian Federation) absamad028@gmail.com

Sabeen Azam,

lecturer, International Relations, National University of Modern Languages, Karachi, Pakistan, sabeen.azam@numl.edu.pk

Erum Naz

*(Recent Graduate of Department of International Relations, Federal Urdu University of Arts, Sciences and Technology, Karachi, Pakistan).
erum0981@gmail.com*

ABSTRACT

In the last twenty years, India has gone through a transformation phase of being an economic backwater to being a threat to the long period of supremacy of China in Asia. Basically, the research in this paper seeks to examine the structural processes of India's growth, such as liberal economic reforms, digital innovation, youthful population, and active trade policy and their effects on regional power relations. Using a comparative prism, it explains how the Make in India and Digital India initiatives of India are aimed at destabilising the Chinese domination in manufacturing and technology. The case studies of the manufacturing industry, digital economy and trade flows show that there are both opportunities and strategic frictions that define the India-China relationship. The discussion on the reformulated role of multilateral organisations such as BRICS, WTO, and the Quad in the mediation and cooperation of tensions is also discussed in the paper. It suggests that it will be up to the ability of both India and China to strike a balance between competition and cooperation in the future to become stable. The results show that it will be necessary to balance such a changing economic competition through delicate trade measures and industry-oriented approaches, and communication between countries.

Keywords: India-China ties, economic competition, Make in India, digital economy, trade policy, Asia-Pacific geopolitics.

Introduction

1.1 Background Information

The main focus of Chinese growth has been centred in China, which has catapulted it to the centre of the economic region of Asia. Since the late 1970s and market reforms, the growth in GDP in China has been colossal, on policies of manufacturing and export-led growth and increasing integration of trade in the world, as well as the overwhelming inflows of foreign direct investment (FDI) and rising levels of trade. Although India had almost the same income per capita in 2022 of about 2,388, China had a per capita income of around 12,720, and there was an initial and violent modernisation policy by China (World Economics, 2025).

India has, in the recent past, been a rising economic power. By instituting some radical reforms, including liberalisation measures in 1991, and modern best practices to Make in India and Atmanirbhar Bharat, India has charted the path of high growth. By doing so, India has been experiencing a growing appeal to foreign investors because it highlights the appeal of 74.39 billion in FDI in the 2019-2020 fiscal year (Government of India, 2024). Furthermore, because the majority of the Indian population of 65 per cent and over is below the age of 35 years, India has a very high demographic dividend as compared to the ageing population in China. Integration of technology, like the rapid digitalisation of India, the growth of fintech ecosystems with passions like UPI platforms, are another trend. According to ANI (2024), the digital economy in India may become 20 per cent of the GDP by 2026.

It is in this regard that the previous surging growth narrative of China was pegged on a sound base of market reform, along with manufacturing capacity and that the recent growth narrative of India is pegged on the base of a young and energetic population, coupled with technological instinct and bold policy reforms. They are transforming the economic forces of the territory and undermining the decades of hegemony in Asia by China.

1.2 Statement of the Problem

This also means that the economic dynamism of power between India and China is no less prominent than that one of the regional or global trade. With the economy of the country going through a recession, it is witnessing a change in the balance of influence in Asia. It comes with opportunities and also threats. India needs to capitalise on its growth potential at the expense of building agonising geopolitical tensions, and China needs to learn how to coexist with a region it can no longer have a monopoly in. A person should be aware of the nature of this competition and the sequence of actions that each country might be pursuing to be able to predict the future of trade, investment trends, and geopolitical orientation in Asia.

1.3 Objectives of the Study

The study is meant to analyse the key variables that continue to drive the development of the Indian economy and its relation to the object of China of regional success. Geopolitically and in trade, it would like to describe the effect that would arise out of the Indian developmental path, which would be much wider in scope. The research will also focus on the future of the Indian-Chinese partnership or conflict as a multi-level and bilateral as well as regional association. Finally, the paper targets to illustrate the impact the emerging India-China dynamic would have on the economic order in the Asian region and the world market.

Literature Review

2.1 Theoretical Framework

Multi-theoretical approach, realism, liberalism and constructivism are needed to understand the complexity of the relationship between India and China.

Out of the various alternatives available to render the Indian perspective on India-China relations, realism stands out as one of the most direct. Using such a realist theory, it can be said that the international system is

anarchic and states seek to maximise survival by trying to secure the maximum amount of power (Waltz, 1979). China sees India's rise in this context as a potential threat to its regional hegemony, and the accompanying strategic competition is occurring in all segments of the economic, military and diplomatic spheres. Therefore, India's proactive involvement in the kind of alliances that are present, such as the Quad (i.e. Japan, Australia and the United States), can essentially be treated as a realist countermeasure to decrease China's expanding influence, particularly inside the Indo-Pacific (Bhuiyan & Wang, 2023). Realist competition manifests itself in border tensions, like Galwan Valley, where the zero-sum belief means the only winner and the only loser and hence non-negotiable interests like territorial integrity and strategic dominance are not relegated.

In contrast, liberalism proposes that economic interdependence and multilateral institutions would reduce conflict and promote cooperation between the two Asian Giants. Even with high political and military tensions, China and India have a large amount of trade between their countries, where China is India's second-largest trading partner (Siddiqi, 2012). Mutual economic benefits, say liberal theorists, render a strong incentive for both countries not to go to war, at least using outright conflict. Avenues to dialogue and cooperation exist in multilateral platforms such as BRICS, the Shanghai Cooperation Organisation (SCO) and the World Trade Organisation (WTO) despite the underlying strategic rivalries (Madan, 2023). From a liberal perspective, economic and institutional environments lead India and China to continue at least some form of working relationship to maintain regional stability and well-being.

In enriching the study of the history of India-China relations, constructivism introduces the role of historical, cultural and ideological factors in defining the relations. However, constructivist scholars argue that state behaviour is not just determined by material interests but also by identities and historical narrations to greater or lesser degrees (Wendt, 1999). Such as the legacy of the 1962 Sino-Indian War continues to affect national

perceptions and mutual distrust (Radchenko, 2014). Moreover, different levels of political ideologies play roles in their international postures—for instance, given that their country is a democracy, India perceives China as a country with adversarial intentions, whereas without political ideologies, China in turn, views India in the same way. "Brotherhood in as 'Hindi Chini Bhai Bhai'" (1950s) and its collapse demonstrate how changes in identity and memory about the past can reshape bilateral relations.

The study of India-China relations under realism, liberalism and constructivism is a more holistic approach to understanding the India-China relationship, which competes, collaborates and collides with one another in contemporary times.

2.2 Historical Context

Indian and Chinese history and the course of their economies offer valuable information on the competition between the two in Asia. Following the independence of the country of India in 1947 and the formation of the Republic of China in 1949, the People Republic of China, these two nations followed different paths due to the political ideologies and historical background.

These are two of the oldest and surviving civilisations of India and China. Until the eighteenth century, they were both mythical places of such great wealth and wisdom within the circles of Europeans. Between the mid-eighteenth century and the start of the nineteenth century, it was in this period that both of these nations, in the eyes of the Europeans, became far behind, primitive and weak nations. By 1820, they were over half a billion combined, and by 1900, they had 700 million. Their population had grown threefold in the twentieth century. But they were two of the poorest nations. The Indian and Chinese have undergone varied historical, political and socioeconomic factors influencing their post-colonial economic progress. After World War II, both nations went in different directions, which were shaped by the experience with colonialism, socialist views, and economic planning (Tseng and Cowen, 2005).

Following its independence in 1947, India adhered to a mixed model of nationalist and socialist policies in the early years, with protectionism and a closed-borders attitude dominating its approach to foreign relations and the global economy (Mousavi & Asadi, 2021). On the other hand, before the initiation of economic reforms, China maintained policies that kept the economy very poor, stagnant, centrally controlled, vastly inefficient, and relatively isolated from the global economy (Morrison, n.d.).

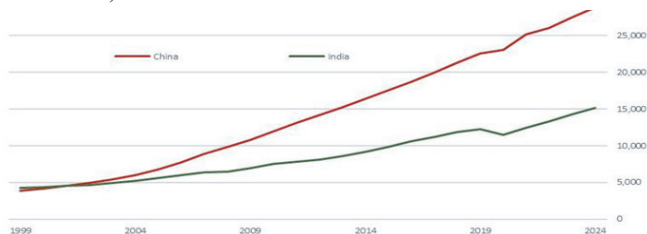
The first decade of "new China" under the Chinese Communist Party was an era of initial growth and development. Following the Chinese Communist Party (CCP) setting up the People's Republic of China (PRC), it embarked on a period of large-scale and long-term economic construction (Think China, 2024). Furthermore, during Mao's period, the Chinese economy was at a time of hardship and extremely unstable. Mao founded a centralized economic system, and everything was focused on the growth of the agriculture sector that was the backbone of the Chinese economy - agrarian in those times (Butt & Sajid, 2018) until market reforms in China started in the late 1970s under Deng Xiaoping, transforming the nation towards a more market economy. These reforms included opening up to foreign investment, state enterprises' privatization, and more competition. Accordingly, China's GDP saw spectacular growth, elevating millions from poverty and making it a global economic giant. A market economy significantly raises its GDP and foreign investment, enabling it to be a global economic giant (Fiveable, 2025). At the same time, between 1989 and 1991, economic adjustment closed the gap between demand and supply in the country; the volume of exports grew exponentially while that of imports collapsed.

Consequently, a favourable balance of foreign trade appeared persistently, and the foreign exchange reserve of China grew at a high rate. During the two decades since the reform and opening up to the world, China's economy experienced a fundamental transformation from a planned one to a market one. The economic power of the nation was reinforced persistently (Embassy of the

People's Republic of China in Nepal, 2004). Additionally, the 1980s and 1990s were turning points in both countries (SociologyInstitute, 2023).

There was not much variation in the sizes of the economies of both nations during the 1980s; in the 1980s, India's per capita income was higher than that of China. In the year 1980, the per capita income of India was \$582, i.e., almost 2 times the Chinese per capita GDP of \$307 (Tyagi, 2024). In addition, by the early 1990s, India was already experiencing a string of economic problems, and in 1991, India was going through an economic crisis. In an effort to manage the crisis, the Indian government, led by then Finance Minister Dr Manmohan Singh and Prime Minister P.V. Narasimha Rao, initiated a string of economic reforms that would subsequently be known as the 1991 economic reforms. These reforms were meant to liberalise, privatise, and internationalise the Indian economy. The objective was to open up the economy, promote foreign investment, and decrease the intervention of the government in economic activities (SociologyInstitute, 2023). However, in 1990, India's per-person income was \$367, and China's was \$317. China was slightly behind India when both nations went into the phase that we call liberalisation. The World Bank's data shows that India's per capita income in 1960 was \$82, while China's was \$89. In 1970, India was at \$112 and China at \$113. In 1980, India was \$266, and China was considerably behind at \$194. In 2000, India was \$1,357, and China was \$4,450. In 2022, India was at \$2,388 and China was at \$12,720 (Tyagi, 2024). According to the World Economics report, China and India had similar levels of GDP per capita until 2001, but since then, China's GDP per Capita has grown much faster than India. China's GDP per capita is now roughly twice India's. China's real GDP per capita has increased by 651% in the last 25 years to over \$29K, while India's has increased by 252% to only \$14K (Figure 1) (World Economics, 2025).

Figure 1: China's and India's GDP per Capita Growth (1999-2024)



Source: World Economics, 2025

Secondly, the two nations historically tried to preserve a peace-friendly demeanour represented by the phrase "Hindi-Chini Bhai Bhai" (Radchenko, 2014), but the Sino-Indian Border War of 1962 brought decades of suspicion and tense economic relations between China and India (Madhuri, 2024). But in spite of the conflict, there was collaboration, and the two nations signed protocols for economic cooperation in 1984, giving each other the most favoured nation (MFN) status for trade. Ever since, India has emerged as China's 20th largest trading partner and its biggest trading partner in the South Asian region since 1994 (Singh, 2000).

Also, India-China relations during the 21st century would indicate the way in which economic interdependence is promoting and will promote the growth of friendly, good neighbourly relations between the two nations with mutual benefit and trust as its foundation. That was reflected in the phrase 'Chindia' originally used by India's politician Jairam Ramesh to refer to the rising economic power of India and China. From this perspective, 'China is the 'world factory', having superiority in manufacturing, agriculture and special zones development. And India, being the 'world office', has strengths in information technology, software in general, pharmaceuticals and the service sector. China is, however, India's biggest trade partner; the reverse is not true with China, which has greater trade with the US, South Korea and Japan compared to India (Siddiqi, 2012).

The rise of multilateral organisations reflects both countries' attempts to increase their regional standing.

Further, multilateral and multilateral institutions such as the United Nations, BRICS, Shanghai Cooperation Organisation, and the Quad have also become theatres of rivalry between India and China (Madan, 2023). especially with respect to border conflicts and China's Belt and Road Initiative, which India remains suspicious of. Nevertheless, the Indo-Pacific strategy is proposed as the answer to counter BRI and Chinese influence regionally and globally. The United States of America, Japan, and India adopted a "common enemy" policy for China (Bhuiyan & Wang, 2023).

2.3 Current Studies and Findings

Recent studies on India's economic policy demonstrate a tremendous paradigm shift, its fast industrialisation and policy changes towards self-reliance and modernisation (Reddy, 2025).

On the 25th of September, 2014, the "Make in India" "Atmanirbhar Bharat" program was initiated, which aimed to make India a world leader in design and manufacturing. One of the first 'Vocal for Local' drives is aimed not only to increase India's manufacturing base but also to bring its industrial might to the international stage (Government of India, 2024). Besides, India has been a desirable site for international investors (Sharma, 2024) because the defenders assert that India has become one of the world's leading destinations for FDI due to the program. For instance, in 2019–2020, India attracted \$74.39 billion of foreign direct investment (FDI) compared to \$45.15 billion in 2014–2015. Critics rebuke that although the manufacturing industry was the focus of the campaign, much of this investment ended up targeting services such as e-commerce and telecommunications. Additionally, some industries continued to face legislative hurdles that dissuaded foreign investment, especially those demanding labour-intensive activities and immense land acquisition (Singh, Singh, & Patel, 2024). Studies bring out the importance of digital platforms in increasing productivity and fostering entrepreneurship, especially by small and medium enterprises (SMEs). In addition, one of the largest internet-based user networks is emerging in India. The

figure multiplies across the board, ranging from online buying to electronic payments. A study conducted by the Internet and Mobile Association of India indicates that there are approximately 759 million active Internet users in India (Pandey et al., 2024). Additionally, the growth of the digital economy of India has been remarkable. It is estimated that India's digital transformation is driving its financial ecosystem towards a USD 1 trillion digital economy by 2028. Government initiatives and technological advancements, like UPI and 5G, are enhancing financial inclusion and boosting digital services in sectors like health, education, and e-commerce. Moreover, the digital economy, which accounted for 4.5 per cent of India's GDP in 2014, is expected to contribute 20 per cent of the GDP by 2026 (ANI, 2024).

However, India's Make in India initiative is a direct response to China's growing industrial and technological dominance (Asmatwali, 2014). In response to India's rising economic stature, China has adopted various strategies to maintain its influence in the region. For instance, the Chinese government launched "Made in China 2025" in 2015 (the government's ten-year plan), a state-led industrial policy that seeks to make China dominant in global high-tech manufacturing. China aims to achieve 70 per cent self-sufficiency in high-tech industries, and by 2049—the hundredth anniversary of the People's Republic of China—it seeks a dominant position in global markets. (McBride & Chatzky, 2019). Furthermore, recent studies indicate that Indian manufacturing sectors heavily dependent on Chinese machinery face setbacks. India's manufacturing sector is facing significant challenges, particularly industries reliant on Chinese imports, such as electronics, solar panels, and electric vehicles (EVs). Chinese authorities have nearly stopped exporting critical equipment essential for production, reportedly to hinder the growth of global companies like Foxconn, BYD, and Lenovo in India, according to a report by The Economic Times (Mukherjee, 2025).

Moreover, in response to China, India has adopted a 'China Plus One' strategy, encouraging companies to

diversify their production bases (Sinha, 2025). World Bank President Ajay Banga has recommended that India capitalise on this strategy, which has already attracted foreign investment (Mukherjee, 2025).

China has sought to bolster its strategic alliances in South Asia, China has expanded trade relations with South Asia, with a significant increase in Chinese exports to the region and it has sought to bolster its strategic alliances in South Asia (Jain,2018). China's extensive investments in infrastructure across South Asia through BRI projects, including ports, highways, and railways, are seen as transformative, providing capital and resources that have made it a preferred partner for many countries in the region. India has pursued alternative projects, such as the Asia-Africa Growth Corridor (AAGC) and Chabahar Port in Iran, to ensure connectivity and strengthen its regional influence (Asmatwali, 2014).

Moreover, the China-Pakistan Economic Corridor (CPEC) is a prime example of this strategy, involving substantial investments in infrastructure and energy projects that enhance China's foothold in the region. While India perceives the CPEC as infringing upon its sovereignty and raising strategic vulnerabilities, which has led to apprehensive responses and counterstrategies, including strengthening ties with other South Asian countries and the United States (Qais et al., 2023). Compared to the case in China of the BRI. The India-Pacific Economic Corridor (IPEC) is even considered a platform of cooperation between India and the United States. Indians believe that it can help India to keep the United States in the lead and China at bay and can help India through projects such as BCIM as soon as the Indian government makes it a reality (Ali & Bibi, 2022).

2.4 Gaps in the Literature

A lot of effort is being made on India and the regional hegemony of China, but there are gaps in the literature. Surprisingly, there are not many resources that conduct a wholesome research on the long-term prospects of India becoming dominant in the sphere of China's regional leverage in the sphere of trade, security, and diplomacy

(Madan, 2023). At the moment, a large portion of the literature it fills is about the short-term evolution of economic indicators, and lacks a comprehensive examination of how Indian development would transform Asian power politics over the next decades. In addition, sector-based research has not been done on such vital concerns as technology, manufacturing and energy. The economic research of the Indian economy takes the Indian economy as a unit without considering and investigating the connection of Indian digital infrastructure, economic science, and high-tech manufacturing to the robustness of the traditions in China (Reddy, 2025). Among the competitive forces of these two countries, industry-specific analyses will be needed more to measure them fairly. In order to fill these gaps, we should develop a more realistic picture of the efficient India-China economic and geopolitical rivalry.

Findings

3.1 Case Study 1: India's Manufacturing Sector

The Make in India campaign and other similar policies have led to a significant change in India's manufacturing sector over the last decade. Make in India was launched on September 25, 2014, with the motive to turn India into a global design and manufacturing hub by promoting domestic manufacturing and FDI (Foreign Direct Investment) (Government of India, 2024). The initiative was focused on 25 sectors, including automobiles, textiles, electronics, and renewable energy, and efforts were undertaken to increase India's participation in global manufacturing as well as generate millions of jobs.

Indians, manufacturing-wise, have already come far since their beginning. From \$45.15 billion in 2014–2015 to \$74.39 billion in 2019–2020, the FDI inflows increased remarkably (Sharma, 2024). The initial investment was drawn mainly to the services sector, but with policy reform such as allowing 100 per cent FDI in some important sectors (by altering land acquisition, giving goods and services tax and others), the investor interest has been revived in manufacturing industries like

electronics, defence and automotive (Singh, Singh, & Patel, 2024).

Unlike China, China's manufacturing dominance was decades old: Economic reforms, inaugurated by Deng Xiaoping in the late 1970s. In the country that became the 'world's factory', there was cheap labour, state-supported infrastructure and a strong export orientation (Morrison, n.d.). The programs include those such as Made in China 2025, launched in 2015, which aimed to gradually relocate China's manufacturing from the low end of production to the high-tech industries, including robotics, aerospace, and electric vehicles (McBride & Chatzky, 2019).

There are indeed distinct differences when India's current efforts are compared to China's past trajectory. Second, while China pursued a highly centralised, state-led industrialisation model under the auspices of State Capitalism, India's Make in India is based on greater liberalisation, public-private partnerships and the lure of global corporations through market incentives. Nevertheless, India's manufacturing share of GDP is only around 17% compared with China's high of nearly 30% in its high growth period (World Bank, 2025). Replication of China's success has been a demand in India's manufacturing sector. Yet, infrastructure bottlenecks, regulatory barriers, and labour market rigidities continue to slow down the process of rapid industrialisation (Reddy, 2025). Further, India's dependence on Chinese imports of machinery and critical components in electronics and solar sectors negates India's goal of self-reliance. The latest report said that Chinese restrictions on exports are delaying Indian efforts to localise manufacturing, particularly in the area of smartphones and electric vehicles (Mukherjee, 2025). However, India has been, if anything, proactive in its strategic response to these challenges. To boost domestic production and decrease reliance on Chinese imports, this government has brought Production Linked Incentive (PLI) schemes in electronics, pharmaceutical and semiconductors sectors. All these incentives are expected to attract big investment, and India is becoming more integrated into global supply chains (Government of

India, 2024).

Global supply chains are becoming more and more realised of experiencing a larger effect. It is this backdrop that Multinational corporations have resorted to the China Plus One approach of diversifying production bases outside of China under various reasons, such as higher costs and political unrest, especially that of the U.S.-China trade war, and India has become a point of great interest (Sinha, 2025). Apple, Samsung and Foxconn are currently stepping up their operations in India as a way of significantly contributing towards the production of electronic products across the world.

In addition to this, it complies with regional and global tendencies towards the expanding involvement of India in the global supply chain. The COVID-19 crisis underlined the frailty of overdependence on the supply chains in China, which triggered additional efforts in the countries that constructed longer, stronger, and more varied supply chains. It is reinforced by measures such as the Supply Chain Resilience Initiative (SCRI) between Japan and India or even Australia, which puts more focus on India in the global manufacturing landscape (Bhuiyan and Wang, 2023).

However, structural issues like lack of skills, logistical and environmental sustainability inefficiencies have to be addressed holistically before India can enjoy the maximum of the opportunities. Reddy (2025) further claims that the demographic dividend in India should be matched with upskilling of the new force, whereby advanced manufacturing industries would be empowered by the new labour force.

Finally, Make in India is reviving India's dreams in the manufacturing industry, but there are many obstacles to cross before it can put India on a challenging platform compared to China. To a large extent, the success of India will be anchored on a prolonged reform application, infrastructure modernisation and formation of strategic alliances with other states. India is also planning to become a player in the transformed world of manufacturing despite the fact that its implementation is highly unlikely as intensive as that of China.

3.2 Case Study 2: Technology and the Digital Econo-

India has evolved to become a formidable digital economy to take the country to the pinnacle of the information technology service and digital innovation scene in the world within the last 20 years. The digital revolution is also driving the economy of the country, as it has a huge and young population and a high uptake of smartphones and the internet. The active internet user base of approximately 759 million in India in 2024 made the country one of the largest online markets across the world (Pandey et al., 2024). In line, as Digital India efforts continue to grow, as well as the worldwide rise in the fintech sector, e-commerce and startup environments, India has come to symbolise the digital economy of the world.

India's tech market had not been as wide and varied as it is now, historically dominated, if not by TCS, Infosys and Wipro, then at least by other large ICT players. In addition to being the home of 110 unicorns in 2024, the country hosts startups in the fintech (Paytm), edtech (BYJU'S) and healthtech and logistics (Logistics startups) space, according to Reddy (2025). With the proliferation of mobile payments, digital wallets and the Unified Payment Interface (UPI) type of real-time online transaction systems, India has increased financial inclusion with the projection that India's digital economy will come to be around 20 per cent of Gross Domestic Product (GDP) in 2026 (ANI, 2024).

However, China's tech giants include global leaders in our digital economy: Alibaba, Tencent, Huawei, and ByteDance. Mainly due to a massive domestic market, the support of homegrown tech firms by the state, and aggressive investments in AI, 5G and e-commerce platforms, China has turned into a technological superpower. Alibaba and Tencent lead in e-commerce and social media, respectively, while Huawei dominates the development of telecom infrastructure on the global stage (McBride & Chatzky, 2019).

While there is most certainly promise in India's tech growth trajectory, differences still exist. Early state-driven strategies such as 'Made in China 2025' and

robust R&D funding, along with protected domestic markets, have helped China's technology sector thrive. In contrast to India, India's approach has been more market-led, with relatively less direct government intervention, focusing on liberalisation, digital infrastructure creation, and facilitating startups. Other than holding key roles, India's government programs, such as Startup India, Digital India, and Make in India, have not dominated the landscape.

Alongside this emergence of India as a tech powerhouse, the geopolitical conflicts between the two countries, indirectly between the US and China, and, by implication, China and its technological development, have increased in the digital space. It was confirmed that the poor relation worsened when a Galwan Valley conflict erupted in 2020, following which India blocked more than 250 Chinese applications like TikTok, WeChat and PUBG Mobile on the basis of data privacy, security, and national sovereignty concerns (Madhuri, 2024). This is a bold action, which is a part of the increased Indian awareness that technology has high strategic considerations, and a willingness to decouple digitally with China.

The blockage of the app was a pivotal moment, altering the technological trends in India. The prohibition of the Chinese apps created room to develop by the Indian startups and Western tech firms. Among the examples, there is the case of such platforms as ShareChat, Chingari, and Moj that rapidly gained popularity as the Made in India alternatives to TikTok (Reddy, 2025). Meanwhile, India has also implemented foreign direct investment (FDI) regulations that mean that any investments made by bordering countries, including China, must first be approved by the government before they can be made, since it will give the Chinese corporations the chance to acquire Indian businesses during the pandemic (Sharma, 2024).

India's strategy for digital self-reliance is an effort to shield its vitally important digital infrastructure from foreign manipulation. These initiatives, such as the development of indigenous 5G networks, domestic semiconductor manufacturing and data localisation

laws, are a way of reducing the security risks of over-dependency on external technologies (Mukherjee, 2025).

However, India's rapid digital rise has several challenges that pose risks to progress. Despite that, India lags behind China in terms of investment in emerging technologies such as AI, quantum computing, and high-end manufacture of semiconductor chips (World Bank, 2025). Investments of Chinese firms into major Indian tech startups like Paytm and Zomato, however, continue to remain a significant, indirect presence in the Indian tech ecosystem through third countries (Mukherjee, 2025).

India has its tech ambition on the world stage, supported by strategic alignments with other like-minded countries. Some of the essential areas of cooperation between India and the United States, Japan, and Australia in the context of the Indo-Pacific Economic Framework (IPEF) and Quad Technology initiatives include collaboration in critical and emerging technologies (Bhuiyan and Wang, 2023). The partnership is a retaliatory strike against the Digital Silk Road programmes by China in the Belt and Road Initiative (BRI) as an allusion to the emerging convergence between technology, economics and politics.

In conclusion, India is experiencing an immense evolutionary stage. The digital economy in India has been anchored on its competent home innovation, a determined startup environment and reflected complementary opportunities supported by policy-level actions. Nevertheless, it is still faced by long-term obstacles due to the fact that China is rooted in hardware production, AI, and telecommunications, to name a few. The online rise of India will also play a crucial role in shaping the lines of India-China rivalry in the 21st century as India grows more technology-diversified and more profound in its global alliances in the field of technology.

3.3 Case Study 3: Trade and Investment Flows

India and China have been standing partners in various fields, and bilateral trade has been one of the most important dimensions of mutual relations. On one hand, they have been growing interdependence and on the other hand, strategic competition. China has always been considered one of India's largest trading partners in recent years. Bilateral trade between the two countries touched \$136 billion in 2022, wherein India's imports from China were around \$101 billion, thus producing a hefty trade deficit (World Bank, 2025). The import of its major items is electronics, machinery, organic chemicals and pharmaceuticals, and dependence on Chinese manufacturing continues.

The relationship is strained, though there are robust trade figures. There has been a persistent dispute along the border, and the violence of the clash in the Galwan Valley in 2020 has worsened political mistrust and is prompting calls by some in India for economic decoupling from China (Madhuri, 2024). Following these tensions, India became stricter with Chinese investments, banning numerous Chinese apps nowadays and increasing domestic manufacturing to decrease dependence on Chinese imports. It became the meeting ground of security and trade policy, a moving platitude as initial trade barriers like increased tariffs, non-tariff measures, and extended customs time were tools of economic statecraft.

Other key trade disputes have also been seen in areas including telecommunications and infrastructure. The decision to bar Chinese firms such as Huawei and ZTE from India's 5G rollout based on security issues was a major step away from the trade policy followed by trade and aligning it with wider geopolitical considerations (Mukherjee, 2025). In this regard, India's push for the development of Indigenous industries through measures like 'Make in India' and 'Atmanirbhar Bharat' (Self-reliant India) is working to reposition itself from trade dependencies to maintaining greater economic sovereignty (Government of India, 2024).

In response to the strategic challenges posed by China, India has reached out and strengthened its economic and security partnerships, particularly through the QUAD Security Dialogue (QUAD) and also deepened India's relations with the Association of Southeast Asian Nations (ASEAN). As a strategic counterbalance to China's growing influence in the Indo-Pacific realm, India, the United States, Japan, and Australia are part of the QUAD. The QUAD was initially proclaimed as a primary security dialogue but expanded into a focus on economic collaboration, leveraging critical and emerging technologies, enhanced supply chain resilience, and development of infrastructure (Bhuiyan & Wang, 2023). The ability of India to simultaneously cooperate with and align itself with the QUAD flows from India's broader efforts to diversify its trade and investment partnerships. Key pillars of the QUAD Vaccine Partnership, semiconductor supply chain initiatives, and critical minerals initiatives led to building alternatives to Chinese domination in areas of key sectors (Madan, 2023). It also shows that India wants to join new multilateral economic structures free of China, if not forced to compete for new ones, to reduce its susceptibility to economic coercion.

The last role India's trade and investment diversification plays is with its relations with ASEAN, as its relations with ASEAN are also important in India's trade and investment diversification efforts. India's fourth-largest trading partner with other ASEAN member states is represented by ASEAN, with a total trade of over \$110 billion in 2022. The engagement with ASEAN began with the operation of the India-ASEAN Free Trade Agreement (AIFTA) in 2010, which has helped boost trade in goods and services. India has tried to deepen connection, trade and investment ties with Southeast Asian countries too through initiatives like the Act East Policy, but they are themselves wary of too much Chinese economic and political influence over them (Siddiqi, 2012).

India's decision to drop out of the China-backed Regional Comprehensive Economic Partnership (RCEP) is notable since it is a sign of the cautious approach used by the country. India was worried about the trade deficit

with China that would acquire and worsen if markets further without good safeguards (Morrison, n.d.). Instead, India has negotiated bilateral and mini-lateral trade agreements with the countries of ASEAN, Japan, Australia and the European Union to expand volatile and diversified economic connections.

India does not lack problems that it has to solve to offset the influence of China in terms of trade and investment in the country. China continues to have its unmatched economic magnitude, and it has deep supply chain control and is actively investing in its Belt and Road Initiative (BRI) throughout the region. Nevertheless, in the case of India, this is not so when it comes to their strategy of selective decoupling, partnership building and domestic capacity enhancement, which is a practical way of thought to conceptualise the complex realities of economic globalisation.

Therefore, despite a long-standing solid trade relationship between India and China, the rising strategic mistrust has caused an actual change in the economic relationship between the two nations. In developing trade and investment relations diversification in terms of QUAD and ASEAN partnerships, India demonstrates its greater commitment to liberating itself from the present economic dependence and increasing economic independence and dominant position of the nation as a major player in the emerging Indo-Pacific order.

3.4 Intervening and Mediation on the International Scene

Through international organisations and regional forums, India and China have also been able to control and reduce tensions between the two countries. The legal systems and arbitration divisions via organisations such as the World Trade Organisation (WTO) have created an organised platform for solving trade disputes. Both India and China are members of the WTO; they have taken advantage of its mechanism to address the issue of tariffs, market access and intellectual property rights. On the other hand, there are also very politicised forms of direct trade friction, but the WTO is a system of rules that is an

unbiased platform to promote adherence to international standards and reduce the likelihood of unilateral escalations (Morrison, n.d.).

Between formal trade institutions, the multilateral groupings such as BRICS (Brazil, Russia, India, China and South Africa) have stood as vital spaces for India–China dialogue and cooperation, even at a time when bilateral disputes have not been in the way. Economic cooperation, sustainable development and reform of global governance are the focus of BRICS. On the one hand, these summits and working groups allow both nations to seek diplomatic engagement, which is focused on the anti-Western financial and political systems they share (Madan, 2023).

Managing India-China tensions has also been provided by regional forums, such as the Shanghai Cooperation Organisation (SCO). Although both India and SCO are new members, a platform became available for both countries to work together on regional security, such as counter-terrorism and transnational crime and add media channels outside the common bilateral format (Bhuiyan & Wang, 2023).

However, the friction between states in these multilateral institutions continues, which nonetheless provides crucial debate, crisis management or the use of diplomacy. They serve as stabilisers by spreading economic interdependence and encouraging multilateralism, thus preventing strategic rivalry from turning into an open conflict.

3.5 Comparative Analysis

Some of the similarities between India and China's competing economic relationships are revealed through the economic competition between the two countries. Economic growth is central to achieving both strategic goals in both nations, so policies emphasise manufacturing growth, technological self-reliance and a worldwide trade influence. Therefore, initiatives like China's Made in China 2025, which promotes homegrown capabilities, as well as India's Make in India initiative, intended to diminish domestic reliance on foreign markets (McBride & Chatzky, 2019) indicate that

they have a strong interest in developing their home-built rather than purchasable capabilities.

The other notable similarity is that both of them are based on state-led and subsidised market-based processes to achieve economic objectives. China has been more state-centric in its approach to intervention, with a high level of government participation, and India is more of a market liberalisation with policy incentives (Reddy, 2025). Meanwhile, the convergence of economics and geopolitics is occurring, and the two nations also tend to prioritise domestic security more than the economic factors in the same industry, digital technology and semiconductors.

Competition is maintained together with cooperation, especially in multilateral frameworks such as BRICS, SCO, and WTO. India and China can find common ground on such issues as global financial reform, climate change, and sustainable development (Madan, 2023). Although there are border tensions and strategic rivalries, both countries see the importance of economic engagement and regional stability.

Therefore, the economic relationship between India and China can best be described as 'competitive coexistence' (simultaneous collaboration and rivalry). The duality between China and India was unquestionably present in Asia's economic and geopolitical landscape and is likely to continue for the foreseeable future.

Conclusion

4.1 Summary of Key Findings

As Asia's economic development accelerates, India increasingly becomes a player in reshaping the power dynamics of Asia and poses a substantial challenge to China's long-standing regional dominance. Structural economic reforms like the 1991 liberalisation, initiatives such as Make in India and Digital India, and the demographic advantage of a youthful workforce are key drivers behind India's growth. The country's technological advancements, booming ecosystem of startups, and growing manufacturing base have made India a leading economic player (Government of India,

2024).

Nevertheless, this China remains a country with a remarkable list of advantages when compared to any United States that may wish to enter or reenter the regions since the dawn of industrialisation, technological innovation, and infrastructure development. The reason is that it is hard to break down the stranglehold of China in the manufacturing sector, high-end technologies, and supply chains spread across the globe. As the Indian level of trade activities has been increasing and India has led with digital innovations, bottlenecks in the infrastructure, the existence of regulatory bottlenecks and vulnerabilities to Chinese imports remain to be persistent. Thus, the rivalry is subtle, India is striking back, yet not caught up with the financial weight of the overall India.

4.2 Future Trade Policy Implications

However, both India and China must adopt realistic patterns of trade in future to be able to withstand the competition without collapsing into a disastrous war. In the case of India, further diversification of the trade partners with ASEAN and the QUAD, and initiatives like the Indo-Pacific Economic Framework, are still the required steps to be made. The reinforcement of domestic manufacturing capabilities, innovation encouragement, and dependence on Chinese imports decrease of key sectors should be the priority (Bhuiyan and Wang, 2023). Nevertheless, a single misstep would swing the pendulum towards China: China would do well to embrace the growing significance of India in the regional supply chains because it can gain out of a partial cooperation, such as in green technologies, regional infrastructure development and multilateral trade arrangements. In the same vein, the two countries must be actively involved in the dispute settlement mechanisms, whether WTO or BRICS, unless trade and investment problems are escalated to larger strategic form hostilities (Madan, 2023).

However, a prudent tapping of trade and diplomatic policy is the ultimate way of ensuring that both nations

are able to deal with the competition, complement and encourage stability in the region.

4.3 Recommendations for Future Research

The economic growth of India in different areas, namely the semiconductors, artificial intelligence and renewable energy, should be incorporated in future research. The other method would be to conduct comparative research on the post-COVID-19 realignment of the supply chain from the Indian and Chinese perspectives. It can also be interesting to further explore how and why the role of third-party actors (mainly the US, Japan, and Australia) in mediating or intensifying India-China economic rivalry is played (Bhuiyan and Wang, 2023).

This kind of research would give a far finer idea of the way the India-China economic rivalry would develop in the next few decades, to policymakers and scholars.

4.4 Final Thoughts

The future economic order between Asia will involve the India-China dynamic. China will definitely continue to be a leading power in the shaping of the global economy, but the rise of India is a counter attractiveness to restore the multipolarity in the region. Their association is split through the competitive co-existence, economic interdependence and strategic competition, and this will determine not only the future of Asia but also the world of trade, security and technologies.

This is not an easy task to navigate despite careful diplomacy, flexible trade policies and a joint determination to ensure stability in the region. The India-China association will be a pivotal dog-whip of the tremendous scale of the world economy and politics that will characterise the 21st century.

References

Ali, S., & Bibi, G. (2022). *China-Pakistan Economic Corridor (CPEC): Regional Swords and Stability*. *Indian Journal of Economics and Business*, 21(1).

ANI. (2024). *India to become \$1 trillion digital economy by 2028*. Available at, <https://m.economictimes.com/news/economy/indicators/india-to-become-1-tn-digital-economy-by-2028-enabled-by-internet-4g-5g-and-digitalisation/articleshow/113875328.cms>

Asmatwali. (2014). *China Rises and India's Response*. *Journal of Emerging Technologies and Innovative Research*.

Bhuiyan, M. S., & Wang, Y. (2023). *India and Japan's response to the Belt and Road Initiative: What China should do?* *China Quarterly of International Strategic Studies*, 9(1-4), 249-267. Available at, <https://doi.org/10.1142/S2377740023500124>

Butt, K. M., & Sajid, S. (2018). *Chinese Economy under Mao Zedong and Deng Xiaoping*. *Journal of Political Studies*, 25(1), 169–178.

Embassy of the People's Republic of China in Nepal. (2004, October 27). *China's Economy*. Retrieved from http://np.chinaembassy.gov.cn/eng/78085/China/200410/t20041027_1998168.html

Fiveable. (2025). *History of modern China review*. Available at, <https://library.fiveable.me/key-terms/history-modern-china/market-reform>

Government of India. (2024). *10 Years of Make in India: Transforming India into a global manufacturing powerhouse*. Press Information Bureau. Available at, <https://pib.gov.in/indexm.aspx?reg=3&lang=1>

Jain, R. (2018). *China's economic expansion in South Asia. Indian Journal of Asian Affairs*, 31(1/2), 21–36.

Madan, T. (Host). (2023). *India-China dynamics in multilateral and minilateral organisations. Global India Podcast, The Brookings Institution.*

Madhuri, A. N. B. (2024). *Arunachal Pradesh: A focal point of confrontation between India & China. Electronic Journal of Social and Strategic Studies. Available at, https://www.ejsss.net.in/article_html.php?did=15312&isueno=0*

McBride, J., & Chatzky, A. (2019). *Is 'Made in China 2025' a Threat to Global Trade? Council on Foreign Relations. Available at, <https://www.cfr.org/background/made-china-2025-threat-global-trade>*

Morrison, W. M. (n.d.). *China's Economic Rise: History, Trends, Challenges, and Implications for the United States.*

Mousavi, M. A., & Asadi, T. (2021). *Towards Liberalisation: A Study of Indian Experience, 1947–1991. World Scientific Studies in Politics and Society. Available at, <https://doi.org/10.22059/wsps.2021.332814.1246>*

Mukherjee, V. (2025, January 14). *How China's export curbs are hurting Indian manufacturing growth. Business Standard. Available at, https://www.business-standard.com/external-affairs-defence-security/news/china-export-restrictions-impact-india-manufacturing-sector-125011400195_1.html*

Pandey, V., Kumar, A. & Gupta, S. (2024). *Assessing the need for the adoption of digitalisation in Indian small and medium enterprises. Open Engineering*, 14(1), 20240072. <https://doi.org/10.1515/eng-2024-0072>.

Qais, U., Aziz, A., & Fazil, D. (2023). China's Economic Engagement in South Asia: Impact on Regional Dynamics. Pakistan Social Sciences Review, 7(4), 492-505.

Radchenko, S. (2014, September 18). The Rise and Fall of Hindi Chini Bhai Bhai. Foreign Policy. Retrieved April 24, 2024, from <https://foreignpolicy.com/2014/09/18/the-rise-and-fall-of-hindi-chini-bhai-bhai/>

Reddy, V. B. (2025, March 28). How the policy shift towards self-reliance is boosting India's economic growth. The Hindu. Available at, <https://www.thehindu.com/education/how-policy-shift-towards-self-reliance-is-boosting-indias-economic-growth/article69348587.ece>

Sharma, D. (2024, May 10). FDI in Make in India: Transforming the manufacturing Available at, <https://www.investindia.gov.in/blogs/fdi-make-india-transforming-manufacturing-landscape>

Siddiqi, F. H. (2012, April). India-China Relations in the 21st Century: Impact on Regional and Global Politics.

Singh, D., Singh, A., & Patel, A. (2024, December 5). Foreign Direct Investment flow in India: Analysing the influence of Make in India campaign. Available at, https://rjhssonline.com/HTML_Papers/Research%20Journal%20of%20Humanities%20and%20Social%20Sciences_PID_2024-15-4-4.html

Singh, S. (2000, January). China-India: Expanding Economic Engagement. Available at, https://ciaotest.cc.columbia.edu/olj/sa/sa_jan01sis01.html

Sinha, S. (2025, February 25). Opinion | India Must Hedge China's Bid To Curb Its Manufacturing Rise. Available at, <https://www.news18.com/opinion/opinion-india-must-hedge-china-bid-to-curb-its-manufacturing-rise>

[dgc-chinas-bid-to-curb-its-manufacturing-rise-9240347.html](#)

Sociology.Institute. (2023, February 4). The 1991 Economic Crisis and India's Liberalisation: Impacts and Outcomes. Available at, <https://sociology.institute/india-democracy-development/1991-economic-crisis-india-liberalisation-impacts-outcomes/>

ThinkChina. (2024, April 19). The first decade of 'new China': In the name of idealism. Available at, <https://www.thinkchina.sg/history/photo-story-first-decade-new-china-name-idealism>

Tseng, W. S., & Cowen, D. (2005). India and China: An essay in comparative political economy. In India's and China's Recent Experience with Reform and Growth (pp. 1-44). Palgrave Macmillan. Available at, <https://www.elibrary.imf.org/display/book/9780230542815/ch001.xml>

Tyagi, P. (2024, August 25). How have the economies of India and China performed in the last two decades? Available at, <https://www.businesstoday.in/latest/economy/story/how-have-the-economies-of-india-and-china-performed-in-the-last-two-decades-442896-2024-08-25>

Waltz, K. N. (1979). Theory of International Politics. McGraw-Hill.

Wendt, A. (1999). Social Theory of International Politics. Cambridge University Press.

World Economics. (2025). China's GDP per capita growth puts India in the shade. World Economics Research. <https://www.worldeconomics.com/Thoughts/.aspx>

Non-farm work decisions in Rural Areas of Pakistan: Motivation, Magnitude and Profitability of Non-Farm Work

Dominance

Mr. Sohail Javed

Lecturer , Applied Economics Research Centre, University of Karachi,
Email: sohailjaved99@gmail.com

Dr. Ambreen Fatima

Associate Professor, Applied Economics Research Centre, University of
Karachi, Pakistan Email: amber_aerc@yahoo.com

Dr. Fouzia Sohail

Assistant Professor Applied Economics Research Centre, University of
Karachi, Pakistan. Email: fauzia_15@hotmail.com, fauzia@aerc.edu.pk

ABSTRACT

The global shift from agrarian to industrial economies has driven a structural transformation of the workforce, with labor transitioning from agricultural to non-agricultural sectors worldwide. While traditional economic theories have long associated rural development with agricultural growth, due to its historical dominance in rural areas, recent decades have witnessed a significant shift. Surveys conducted in developing countries since the 1980s have highlighted the growing reliance of rural populations on the non-farm sector, underscoring a significant socio-demographic and economic transformation in rural economies [Malik (2008)]. Despite over half of rural Pakistani laborers engaging in non-farm activities, the country's dominant development paradigm has traditionally focused on agricultural growth as a means of alleviating rural poverty. However, non-farm activities offer a vital opportunity for rural households to diversify their income streams and mitigate the impact of agricultural shocks, such as price fluctuations, droughts, and floods. In the face of growing landlessness, poor households increasingly rely on non-farm earnings as a crucial means of survival, highlighting the need for a more inclusive development approach that acknowledges the importance of non-farm livelihoods in rural Pakistan [Stifel (2010)]. The objectives of the study are (i) to assess the magnitude of Non-farm Enterprises by Region, Province and Sector and (ii) to

explore the factors influencing the individual decision to operate a Non-farm Enterprises in the rural economy

Introduction

Like everywhere in rural areas, especially in Pakistan, the work is when attached to agrarian-based or agriculture, the majority of people are employed as labour on farms or the activities related to farms, making them tenants, reducing their freedom to work, not letting them do their own-account work. This dependency restricts productivity and financial freedom. Due to this dependence, some people opted to have their own small-scale business. The home-based economic activities in countries like Pakistan are blooming with time. For the past few years, there has been a constantly increasing trend. The own-account work not only helps provide income but also contributes to the bigger picture, i.e., the country's GDP, by engendering small-scale income-generating activities. The dynamics of small and medium industries are significantly important as they are the engine for employment at the micro level, not only in urban areas but in rural areas as well. Although a general perception regarding the presence and significance of the Micro and Small enterprises (MSEs) is that they are informal, unregulated, and unorganised residuals of the formal sector, though these are constantly turning into generating an income stream and increasing self-employment. The informal sector's assistance provides a more comprehensive range of income-generating avenues at a smaller scale with wealth creation and innovation development.

The argument of the informal sector providing employment has been in the limelight since the early seventies. The issue was first raised by the ILO World Employment Program with the publication of the Report on Kenya in 1972, and after the pivotal contribution of Hart (1973). Almost 50 years later, the discussion related to the measurement elaborates briefly on the informal sector (Mead, D. C., & Morrisson, C. 1996). This caught attention while considering the existence and informality of the informal sector and its importance for policymakers (Maloney, W. F. 2004). The policymakers have taken great interest in understanding the

relationship between employment, development, and poverty elevation (Jütting, et al. 2008). The presence of informal business is significantly essential as it generates employment, which ultimately benefits in raising the standard of living of both employees and employers, especially in rural areas. For the nation, it contributes to accompanying the large-scale modern sector enterprises, which utilize the raw materials of agriculture and plays the role of intermediaries, that deal only with small-scale producers and helps in mobilizing the resources (Kamunge, et al. 2014).

Nevertheless, there is another side that looks towards those impediments any individual has to face while doing own-account work, which drags them into a situation that leads them to a position where many perform miserably and fail to grow their businesses (Kamunge, et al. 2014). The fact and a common mindset recognised by the majority is that only the big businesses are the providers of income prospects and hence considered as the foundations of the nation's economic activities; but small businesses have also enhanced giant economies such as the USA and UK (Agyapong, D. 2010). Small and medium-scale businesses are the ones, that place a significant impact at the mass level; thus, in many economies, the authorities took the initiative to take strategic and financial counselling programs that uplift and support small businesses.

Further, the hub of the majority of world economies relies on SMEs, which account for a substantial share of the GDP and employment (Fredrick, 2005). However, the fact is undeniable that doing own-account work is not easy. Small entrepreneurs' main constraints are a lack of working capital and marketing difficulties (Tambunan, T. 2007). Another essential factor we cannot ignore is the presence of the Government to promote such small businesses for growth. The Government's support in facilitating, such as giving subsidies on basic amenities or helping them provide small funds, can play a pivotal role for small business owners to help them initiate their business (Adeusi, SO, & Aluko, OA 2014) especially in areas where employment opportunities are limited such as in rural areas.

Considering all the pros and cons, this study focuses on the factors motivating individuals to undertake self-employment in rural areas of Pakistan. The socio-economic causes and constraints faced by the individuals willing to do own-account work are explored in the analysis part. The study presents both descriptive and empirical analysis to dive deep into the issue, and identify how one gets motivated to work for his/her own self instead of working for anyone else. Although it gives prodigious pride and independence for doing business, not to get paid by someone else, yet the fixed salary which one gets at the end of the month is a great attraction that encourages individuals not to risk leaving a fixed salary job. This is why most prefer to get hired, while a few reject it and take the risk of doing their own-account work. Specifically, for this study, we will keep our objectives limited to exploring (i) the magnitude of the non-farm work and its profitability, and (ii) exploring the factors motivating individuals to undertake self-employment, mainly socio-economic causes and constraints faced by individuals, which are focused on while proceeding with own-account work. The study is organised as follows: In the next section, limited but valuable literature is evaluated, whereas, section three describes the methodology and economic model employed in the study. Section four discuss both the descriptive and empirical results

Literature Review

Economists have presented the picture of self-employment from different perspectives. Many have encouraged the rising demand for self-employment as it reduces the dependency of individuals by enabling them to not only create earnings for themselves but also provide new avenues of income generating esteems for others. This study will specifically shed light on those factors that work as driving forces for individuals who encourage them to opt for a different path of self-employment and highlight those constraints and socio-economic factors that work as barriers to their self-employment. It is well-established that "Micro and Small enterprises" (MSEs) are widespread in many

developing countries. Even though they exist in large numbers, MSEs are often seen as low-income activities that do not contribute to the economy.

Expanding small businesses at the individual level, helping them from authorities for their sustainability, and giving them incentives to boost the process of generating mass-level income-generating activities was discussed in a study performed by Larsson, E., Hedelin, L., & Gärling, T. (2003). They highlighted the issue of rural regions facing the declining rate of population and the shortage of employment opportunities as the inspiring reason for the expansion of persisting small businesses. The study highlights the importance of small businesses and considers it an instrumental factor that helps expand other small businesses; hence, their presence is considered essential for the regional economic growth policy.

Naudé, W. (2010) examined the significance of development economics and its connection with entrepreneurship. They highlight how both have gained swift development in the past 50 years as a subsidiary field within their respective fields of economics and management. The study highlighted the critical factor that they grow in somewhat isolated conditions as entrepreneurship stays only within touch to the entrepreneurship and development economics field focuses on global and country-level determinants of economic performance. The study also gives importance to the fact that how millions of people live in absolute poverty. Globally, it is time to understand if entrepreneurship is binding a constraint on economic development and helping developing countries catch up with developed economies. The study proposed that this sort of analysis needs profound theoretical modeling of the entrepreneur in developing economies. The study shed light on the importance of entrepreneurs in significant areas such as development economics, structural change, economic growth, income and wealth inequalities, welfare, poverty traps, and market failures. In another study performed by North, D, & Smallbone, D (1996), the rising interest and the potential contribution of small and medium-sized enterprises (SMEs) to

developing countries. Even though they exist in large numbers, MSEs are often seen as low-income activities that do not contribute to the economy.

Expanding small businesses at the individual level, helping them from authorities for their sustainability, and giving them incentives to boost the process of generating mass-level income-generating activities was discussed in a study performed by Larsson, E., Hedelin, L., & Gärling, T. (2003). They highlighted the issue of rural regions facing the declining rate of population and the shortage of employment opportunities as the inspiring reason for the expansion of persisting small businesses. The study highlights the importance of small businesses and considers it an instrumental factor that helps expand other small businesses; hence, their presence is considered essential for the regional economic growth policy.

Naudé, W. (2010) examined the significance of development economics and its connection with entrepreneurship. They highlight how both have gained swift development in the past 50 years as a subsidiary field within their respective fields of economics and management. The study highlighted the critical factor that they grow in somewhat isolated conditions as entrepreneurship stays only within touch to the entrepreneurship and development economics field focuses on global and country-level determinants of economic performance. The study also gives importance to the fact that how millions of people live in absolute poverty. Globally, it is time to understand if entrepreneurship is binding a constraint on economic development and helping developing countries catch up with developed economies. The study proposed that this sort of analysis needs profound theoretical modeling of the entrepreneur in developing economies. The study shed light on the importance of entrepreneurs in significant areas such as development economics, structural change, economic growth, income and wealth inequalities, welfare, poverty traps, and market failures. In another study performed by North, D, & Smallbone, D (1996), the rising interest and the potential contribution of small and medium-sized enterprises (SMEs) to

economic development affirm the more outstanding contribution of rural SMEs.

Adeusi, SO, & Aluko, OA (2014) discussed the role of Government in promoting small businesses. The study was performed in Kogi state of Nigeria with a specific focus on Kabba/Bunu's local government area by taking primary data from forty small business owners. The data were selected randomly; the analysis was performed by regressing the ANOVA analysis method. The study confirms the significant impact of the correlation of the Government's role in promoting small business; moreover, it was recommended in the conclusion of the study that banks should promote the small business owner by landing loans and considering the size of the business while imposing tax on it.

Chreneková et al. (2015) debated the informal economy and considered it challenging to explain for determining the impact of the informal economy on the development of the rural region of Ukraine. In 2003, the international conference of labour statisticians approved a guideline that defines the statistical categories of informal employment and includes unregistered/own-account workers, contributors in family work and persons who work based on an oral agreement. The study points out that informal economy and its assessment are difficult to evaluate. However, in some countries, the informal sector is considered a negative occurrence to be tolerated as a the issues of fiscal implication especially linked with tax revenue loss are associated with it. However, it helped in the development of the rural regions and communities. The study evaluates the informal sector's role in Ukraine's regional structure by confronting the findings with the regional divergence by the concerned indicator of the development and quality of life. The study highlights that there are noteworthy differences in the size of the informal sector's employment and different types of Ukrainian regions by rural-urban typology. The study also noted that the increasing contribution of informal employment in the regions is causing the household income level to diminish even though they consider the unemployment level.

Having the limited availability of the data and

information in hand, the study taken by Tulus, T. (2009) worked on the development of women entrepreneurship in the Asian developing economies, as the issue at hand was quite imperative due to the ongoing national efforts for improving the poverty reduction measures in developing economies in the context of Millennium Development Goals (MDGs). The known fact that better income opportunities for women eventually helped improve the living standard of households and aided in reducing poverty was the key factor behind it. The study was based on data analysis and the latest literature review. The study's core focus was women entrepreneurs in small and medium enterprises. It was revealed in the study results that three main factors influence the decision to be an entrepreneur; first was SMEs are the most crucial factor as they cover almost 95% of all the firms in the sector, hence their importance is undeniable. The second important point was that the presence of women as entrepreneurs is relatively low, which can be caused by a lower level of education, no or little capital availability, and religious culture. The third point was that most of the women entrepreneurs were forced entrepreneurs, indicating that the availability of the better education and paid employment opportunities increase will decrease the chances of women entrepreneurs in SMEs.

Fuller-Love, et al. (2006) evaluate the presence of the policies that support the idea of entrepreneurship in the rural region and support in developing the foresight by using the scenario analysis in Mid Wales. It was found in the study that there is a need to collaborate with the foremost stakeholders for the betterment of small firms and minimize the barriers to the growth of firms in rural economic regeneration.

Henderson, J. (2002) shed light on the fact that the presence of entrepreneurs creates economic growth by establishing new firms that generates economic activity and employment. Due to this fact, the policymakers of the rural economy transfer their focus and give importance to the fact that most entrepreneurs start their work from limited resources in various industries and places, making the policymakers support a wide range of

entrepreneurs. Nevertheless, there is still the chances of policy failure because the benefits of entrepreneurs can vary from one entrepreneur to another depending upon their desire to succeed in building a high-growth business. Keep in mind that rural areas do not possess such high-growth entrepreneurs. The study also highlights a newer perspective of entrepreneurial activity in rural America and discusses new ways of policymaking to encourage high-growth entrepreneurs in the community.

Parameswar, et al. (2019) discoursed that many researchers have explored the presence of general and technological entrepreneurship (TE) but empirically validating the impact of multiple factors on TE and its role in the development in South Asia is rare. The study evaluates the influence of TE and develops a model that works for modeling and utilizing the total interpretive structural modelling (TISM) method to see the factors impacting the TE by utilizing the data collected from the focus group discussion by the founders of TE.

Raj, R. S., & Sen, K. (2015) discusses the limitations associated with finance in determining the lack of transition of firms, particularly in the case of India, from trivial family firms that are the predominant types in the informal sector to larger firms that employ non-family labour. The analysis was performed by the survey of the Indian informal manufacturing sector provided by the national-level survey. The study was disaggregated at the district level to see the impact of the financial constraint in the transition of the informal sector. It highlights the presence of financial issues while the informal sector firms are growing. The study concludes that financial aid provided, the firms will grow from small household enterprises to non-household enterprises.

Methodology

The study has a core focus on individuals doing own-account work. Keeping in mind the aim, the study employs data from PSLM/HIES collected by the Pakistan Bureau of Statistics (PBS) for the period 2019-2020. It is imperative to evaluate the factors that motivate individuals towards doing their own work. The study focuses on evaluating the magnitude of individuals working on their own basis and generating income. In order to evaluate the success/ failure of the non farm work study evaluates the net income generated, gross profit, cost of goods sold, total revenues, interest payments, operating expenses, and tax paid by own-account workers. These indicators will help in identifying the size of the work and are calculated by employing the following formulas:

Gross profit and net income are calculated by employing equations (i) and (ii) respectively,

Gross profit (Entrepreneur Growth) = Total Revenue – Cost of goods sold (i)

Net Income = Gross profit – operating expenses – interest expenses – Taxes (ii)

With the help of evaluating the magnitude of the own account owner or in other words, entrepreneurs who are involved in income-generating activities, we will be able to then move to the other objective, which is exploring the motivation of doing non-farm work. This objective can be achieved by assessing the socio-economic characteristics of the household where that individual resides. The study has examined individuals' socioeconomic conditions and also evaluate their personal characteristics, for instance, education, age, basic utilities are taken into consideration. The personal characteristics of the head of the household where that individual resides are also crucial as they give the basic ground to do their own business. The education of the head of the household, the size of the house, and lastly, whether the region or province has any significant impact are included in the model. The study considers the economic model (equation iii) to evaluate the objective. The econometric techniques use to estimate the model is probit. As the decision to own and operate the non-farm work is dichotomous. This study ran a

Probit model by taking non-Agri Enterprise equal to 1, otherwise zero, as the dependent variable.

$$\begin{aligned} & \text{[NAGENT]} \text{ } _ipt = \beta_0 + \beta_1 \text{ [PER]} \text{ } _ipt + \beta_2 \text{ [HSC} \\ & \text{] } _ipt + \beta_3 \text{ [DMG]} \text{ } _ipt + \beta_4 \text{ [CT]} \text{ } _ipt + \varepsilon _ipt \end{aligned}$$

(iii)

Where NAGENT is a dummy variable representing if a person owns/runs an enterprise. PER represents the personal characteristics (age, age square, education of individual doing own-account work). HSC is the representative of household characteristics, includes the availability of electricity, gas, tap water, toilet, and size of the house (represented here as the congestion in the house). DMG is the representative of demographic characteristics. While i, p, and t represent individual, province, and time respectively.

Results and Discussion

The result section is divided into two parts. The first part explores the results of the first objective, mainly using the descriptive statistics while the second part explores the second objective i.e the results of the empirical model by using the probit model.

Descriptive Analysis

Identifying the importance of own-account work as getting a job is significant, especially in rural parts of the country where economic activities are limited only to agrarian and agro-based work is grim. Most people settled in rural regions are associated with work where they rely on the landlord, making them dependent on them. The situation of own-account workers and those individuals who are thriving in the field of doing work own by themselves, the study took the data from PSLM/HIES for the year 2019-20 and performed descriptive analysis.

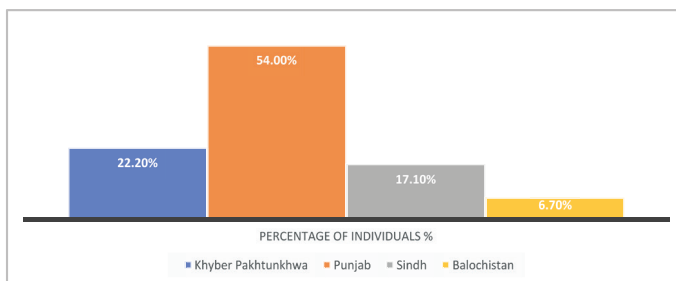
Table-1: Individuals Reporting own work

Province	Count	Column N %
Khyber Pakhtunkhwa	1304	22.20%
Punjab	3167	54.00%
Sindh	1000	17.10%
Baluchistan	390	6.70%
Subtotal	5861	

Author's own estimations based on PSLM/HIES 2019-20

Table 1 and Figure 1 signify the number and percentages of individuals who have reported being actively involved in own-account work. Punjab province is on top with 54% having the highest ratio, while KPK stands in 2nd position and Sindh province in 3rd rank; although the population of Sindh province is higher than KPK, the people living in Sindh province prefer being employee, and this is exactly matched with the findings in hand, and then again it shows how many people are more intended towards doing their work. For Baluchistan province, this number is 390, with a percentage of 6.7% only.

Figure-1: Province-wise data of own-account workers



Author's own estimations based on PSLM/HIES 2019-20

Table 2 has shown the magnitude of the non-farm work with age segregation. If we investigate the Table 2, it is seen through the data that own-account work is prevalent highest in the age category of 46 years and above, indicating that people prefer to do their own work after a certain age as doing a paid job cannot help in the process of wealth-generation. Moreover, the sense of freedom for being answerable to no one is the crucial motivation behind it; however, the age brackets of 26-35 and 36-45 are also showing a promising picture, indicating that more people have shifted themselves towards their own work.

Table-2: Magnitude of Own Enterprise by Age Group

Province	Age I	Magnitude of Own Enterprise	
		Count	Column N %
Khyber Pakhtunkhwa	14-25	202	15.5%
	26-35	361	27.7%
	36-45	356	27.3%
	46 & above	383	29.4%
	Subtotal	1302	100.0%
Punjab	14- 25	384	12.1%
	26-35	853	27.0%
	36-45	910	28.8%
	46 & above	1018	32.2%
	Subtotal	3165	100.0%

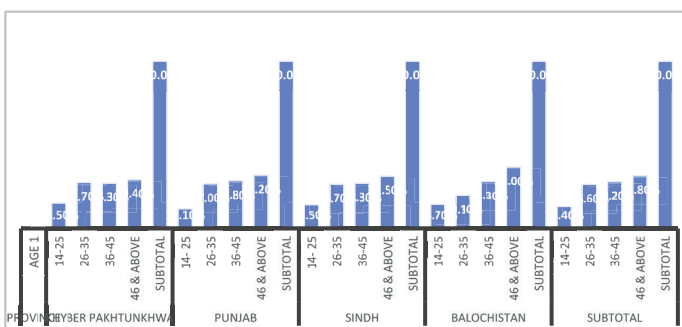
See Figure 2 for graphical representation of percentage of own account workers by Province.

See Annex 1 for the magnitude of the non-farm work by Industry.

Sindh	14- 25	144	14.5%
	26-35	266	26.7%
	36-45	272	27.3%
	46 & above	314	31.5%
	Subtotal	996	100.0%
Balochistan	14-25	57	14.7%
	26-35	78	20.1%
	36-45	110	28.3%
	46 & above	144	37.0%
	Subtotal	389	100.0%
Subtotal	14-25	787	13.4%
	26-35	1558	26.6%
	36-45	1648	28.2%
	46 & above	1859	31.8%
	Subtotal	5852	100.0%

Author's own estimations based on PSLM/HIES 2019-20

Figure-2: Magnitude of Own Work by Age Group



Author's own estimations based on PSLM/HIES 2019-20

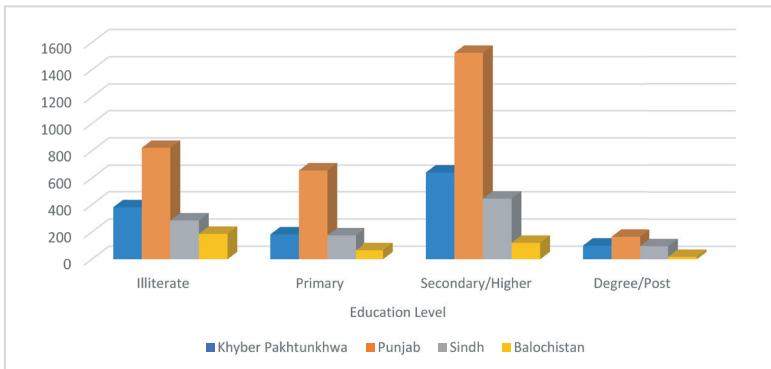
Table-3: Magnitude of Own Enterprise by Education Level

Province	Education Level			
	Illiterate	Primary	Secondary/Higher	Degree/Post
	Count	Count	Count	Count
Khyber Pakhtunkhwa	381	182	641	100
Punjab	822	656	1524	165
Sindh	284	175	445	96
Baluchistan	186	66	120	18

Author's own estimations based on PSLM/HIES 2019-20

Education is one of the most significant reasons that either persuade or dissuade the attention of individuals towards doing their own work. The social norms in our society have fixed this mindset that if an individual is educated, he/she should acquire a secure job for a better future. The same is visible from Table 3, showing more people are inclined towards their own-account work with secondary or higher secondary education. Figure 3 also shows that the higher the level of education i.e. graduation or more, the lower the participation or interest in own-account work.

Figure-3: Education level of Own-account workers



Author's own estimations based on PSLM/HIES 2019-20

Table 4 presents the existence of the own-account work with the industry-wise distribution. The data indicates the highest number of owned-account workers in only a few industries, where wholesale and retail work is on top, with the highest number of individuals in all provinces. The second industry with the highest population is transportation and storage, while the third one is the manufacturing sector, mainly related to textiles.

Table-4: Existence of own-account worker industry wise

Industry code with two digit	Province			
	Khyber Pakhtunkhwa	Punjab	Sindh	Baluchistan
Agriculture, forestry and fishing	4	18	12	3
Mining and quarrying	2	0	0	0
Manufacturing	200	485	96	27
Electricity, gas, steam and air conditioning supply	1	0	1	1
Water supply; sewerage, waste management and remediation activities	3	4	3	1
Construction	14	30	5	2
Wholesale and retail trade; repair of motor vehicles and motorcycle	654	1454	579	258
Transportation and storage	264	517	158	57
Accommodation and food service activities	22	141	39	20
Information and communication	6	4	2	0
Financial and insurance activities	0	2	0	0
Real estate activities	21	46	20	5
Professional, scientific and technical activities	16	37	7	1
Administrative and support service activities	11	17	1	1
Public administration and defence; compulsory social security	3	0	0	0
Education	5	43	2	0
Human health and social work activities	21	53	10	2
Arts, entertainment and recreation	4	11	3	0
Other service activities	53	302	62	12
Activities of households as employers; undifferentiated goods	0	3	0	0

Author's own estimations based on PSLM/HIES 2019-20

The analysis below discloses the findings of the total individuals engaged in own-account work activity. Table 5 has disaggregated the net income, province-wise and findings show that for Khyber Pakhtunkhwa province 1219 individuals having own businesses reported annual income Rs. (16,46,055), for Punjab, it is Rs (19,01,706) with 3006 individuals, Sindh province having 970 individuals with a mean income of Rs (16,16,727) and for Baluchistan province, a total of 366 individuals with the mean income of Rs(16,76,831) recorded. The minimum and maximum values depict that the net income ranges between Rs (3500) to Rs (7008800) for Khyber Pakhtunkhwa, Rs (1600) to Rs (120477000) for Punjab, Rs (12000) to Rs (97824000) for Sindh province and Rs (36000) to Rs (107968800) for Baluchistan.

Table-5: Net Income by Province

Province	Count	Mean	Standard Deviation	Minimum	Maximum
Khyber Pakhtunkhwa	1219	1646055	4553071	3500	70088000
Punjab	3006	1901706	5414709	1600	120477000
Sindh	970	1615727	4333062	12000	97824000
Baluchistan	366	1676381	6189233	36000	107968800
Subtotal	5561	1780953	5117773	1600	120477000

Author's own estimations based on PSLM/HIES 2019-20

Table 6 bestows the Gross Profit. According to the summary statistics, the highest gross profit reported is Rs (18,99,723) for Punjab province. Surprisingly, Balochistan stood in the second-highest position with a gross income of Rs (16,76,381), Khyber Pakhtunkhwa and Sindh reported Rs (16,41,735) and Rs (16,15,727) respectively. The maximum and minimum gross profit for Khyber Pakhtunkhwa is Rs (700,88,000) and Rs (-168,000), for Punjab it is Rs (1204,77,000) and Rs (-261,600) for Sindh it is Rs (978,24,000) and Rs (12,000) and for Baluchistan the range of gross profit was recorded at Rs (1079,68,800) and Rs (36,000) respectively.

Table 6: Gross Profit by Province

Province	Count	Mean	Standard Deviation	Minimum	Maximum
Khyber Pakhtunkhwa	1222	1641735	4548310	-168000	70088000
Punjab	3009	1899723	5412374	-261600	120477000
Sindh	970	1615727	4333062	12000	97824000
Baluchistan	366	1676381	6189233	36000	107968800
Subtotal	5567	1778925	5115388	-261600	120477000

Author's own estimations based on PSLM/HIES 2019-20

The analysis presented in Table 4 demonstrates a more precise picture of the magnitude of non-farm work by industry, while Table 7 illustrates the Net income province-wise with the disaggregation of sectors. The analysis shows an outstanding contribution of wholesale and retail business for all provinces, while human, health and social activities stood in 2nd position, and agriculture, forestry, and fishing in 3rd position collectively.

Table 6: Gross Profit by Province

Industry code with two digits	Province				Subtotal
	Khyber Pakhtunkhwa	Punjab	Sindh	Baluchistan	
	Mean	Mean	Mean	Mean	
Agriculture, forestry and fishing	-220750	4555389	116000	1730800	2370227
Mining and quarrying	145500	.	.	.	145500
Manufacturing	-277158	-259054	1585371	4012800	98352
Electricity, gas, steam and air conditioning supply	252000	.	814996	1731000	932665
Water supply; sewerage, waste management and remediation activities	372000	568500	612864	630000	532599
Construction	389314	-77793	686760	330000	141380
Wholesale and retail trade; repair of motor vehicles and motorcycle	2517607	3371819	2229999	1511372	2794650
Transportation and storage	262533	299289	219231	258086	274488
Accommodation and food service activities	-680066	558944	310831	-2176818	146107
Information and communication	293233	702000	811800	.	515917
Financial and insurance activities	.	4716000	.	.	4716000
Real estate activities	-1036533	719717	537180	2455484	373487
Professional, scientific and technical activities	347413	846898	481929	900080	674875
Administrative and support service activities	550728	380588	1116000	1220040	495468
Public administration and defense; compulsory social security	639933	.	.	.	639933
Education	248796	174240	364000	.	189286
Human health and social work activities	6382876	578793	311400	702000	1967842
Arts, entertainment and recreation	369999	253891	156000	.	263378
Other service activities	377058	234852	248862	281800	255759
Activities of households as employers; undifferentiated goods	.	203600	.	.	203600
Total	1381851	1669755	1534201	1273976	1556236

Author's own estimations based on PSLM/HIES 2019-20

Empirical Results

This section of the study presents the result of the empirical model illustrated above to explore the factors motivating individuals to engage in account work. Table 8 presents the results, while the following paragraphs discuss the findings.

The demographic characteristics associated with the person willing to work or establish their own-account work are crucial, as they will be helpful to define the grounds for starting their own enterprise. Considering this fact, the study regresses personal and demographic characteristics to assess the feasibility of starting a small

enterprise, preferably to examine the relationship between own-account work and existing household facilities. The analysis presented in Table 8 expresses the relationship. In the beginning, personal characteristics such as age and education are considered.

The coefficient for years of education shows a significant positive relation. Precisely, for one unit increase in the years of education, the probability of doing own-account work upsurges by 0.006 (in terms of coefficient). Age is negatively related to it; as age increases, the likelihood of moving towards doing own-account work is reduced.

The most imperative indicators this study has included in the model are household characteristics, as they are crucial determinants when considering starting an enterprise. It is a well-known fact that one cannot work on ideas without having a meal. The same goes when it comes to household conditions. The study has taken congestion as a proxy for assessing household size. While following the same rule in mind, the study has taken into account the amenities (Gas, Electricity, tap water, toilet) to judge how well-off an individual is when he/she makes up his/her mind for initiating own-account work as it is almost impossible to think out of the box when one occupied to perform the hassle of a day-to-day task. The variable of *gas_hh* shows the availability of gas in a given household. The coefficient of gas has the value of 0.222, indicating that for every one unit increase in gas, the dependent variable (here in our case is the probability of doing own-account work) increases by 0.222; the standard error for *gas_hh* has the value of 0.009, demonstrating that the coefficient of the gas has a positive and significant impact on the dependent variable. The electricity variable has a coefficient of 0.256 with a standard error of 0.013, signifying that the dependent variable will rise by 0.013 units for every one-unit increase in electricity. For tap water and toilet availability in a household, the variables are labelled as *toiled_hh* and *piped_water_hh*, respectively. The coefficient for the toilet is 0.069 with a standard error of 0.008, representing an increase in one unit of the availability of toilet; the chances for doing own-account work upsurges by 0.069.

Moving ahead, a key role while letting an individual decide to pursue their career as an entrepreneur is access to basic facilities, which creates feasibility for its residents to think beyond boundaries. Where an individual resides is an influential factor, as that is precisely what our findings show. The variable to see the size of an individual's house is congestion. This variable has to have a negative sign. The coefficient of congestion has the value of -0.363, portraying that with one unit decrease in the size of the house, the probability of doing own-account work reduces by -0.363, with a standard error of 0.016. The value for both congestion and piped water is aligned with the findings of a study conducted (Sultana et al. 2020). i.e. the household where an individual resides must have a size that lets him start the household enterprise within house premises.

Moving further, another critical indicator to gauge the probability of starting own-account work is associated with the personal characteristics of the head of the household. The age and education of the head of the household are decisive variables in our model because they define how achievable it is for that person who is an entrepreneur and doing or willing to do his/ her own-account work. The coefficient value for the years of education of the head of the household is 0.007. It depicts that with a one-unit increase in the education of the head of the household, the chances of doing own-account work will increase by 0.007. Likewise, the coefficient value for the age of the head of the household is 0.003, portraying a one unit increase in the age of the head of the household, the chances of doing non-farm work are augmented by 0.003.

The provincial and region-wise participation indicates the residents of which province have higher chances to start their own-account work. The analysis (kept the Khyber Pakhtunkhwa as a benchmark) shows that Punjab, Sindh, and Baluchistan have a significant negative impact on starting own-account.

Table 8: Empirical Model

hh_ent_dummy	Coef.	Std. Err.	z	P>z	
Yrsedu	0.0064	0.0010	6.62	0.00	
Age	-0.0011	0.0007	-1.60	0.11	
age_sq	-0.000004	0.00001	-0.44	0.66	
gas_hh	0.2225	0.0091	24.47	0.00	
electricity_hh	0.2560	0.0133	19.21	0.00	
toilet_hh	0.0695	0.0085	8.17	0.00	
piped_water_hh	-0.0116	0.0092	-1.26	0.21	
congestion_hh	-0.3636	0.0166	-21.87	0.00	
head_yrsedu_h	0.0073	0.0008	9.25	0.00	
head_age_h	0.0032	0.0003	11.65	0.00	
province					
	2	-0.0806	0.0093	-8.65	0.00
	3	-0.5040	0.0114	-44.37	0.00
	4	-0.3146	0.0139	-22.68	0.00
2. region	0.3517	0.0089	39.63	0.00	
_cons	-1.0548	0.0210	-50.21	0.00	

Author's estimations

Conclusions and Policy Recommendations

The rapidly changing world and its demands are diversifying on a daily basis. The rising trends of startups have taken a rise globally. People prefer to work for their startup instead of working for someone else as it gives both self-esteem and a sense of freedom while reducing dependency on anyone else. It is commonly seen that to keep up with the world, just go with the flow. Following the same, a higher increase has been witnessed both globally and domestically to start own-account work on a small scale. Most of the work that individuals prefer to start working on, especially in the country's rural region, is limited to within the premises of their homes. This step saves the initial investment or fixed capital and helps individuals minimize the risk of loss.

Keeping the idea of working from home in mind and assessing the trends and expected future of own-account work, this study has a few suggestions to improve and promote own-account work. The Government should promote small-scale and own-account work by providing technical and professional training free of cost. This step helps individuals start as freelancers, and with the growth of their business, they will scale it by giving income opportunities to others as well. The Punjab government has taken the initiative, providing skilled-based learning opportunities to the masses with programs like Digiskill , E-rozgar , digiPakistan and many more, promoting education, especially IT-related

skills. The same strategies are required to promote training-related programs for agriculture and the small-scale cottage industries linked with agro-based products. The step will lift not only the employment opportunity for individuals but also helped the Government to employ the labour force associated with the agriculture industry, which are part actually part of disguised unemployment.

The second most imperative step is to give subsidized basic amenities like Gas, Electricity, and tap water to those individuals who have declared themselves associated with own-account work by following the example of China. By doing so, the domestic industry associated with the agro-based industry will be enhanced, helping individuals to put in less capital and get better profits. Like China, Bangladesh adopted the same strategy and encouraged the population to get educated and trained and work in a home-based business. This policy improves the cottage industry in the country and aid in reducing unemployment. The small-scale startups in Bangladesh push the country to achieve the highest GPD growth in the region, leaving Pakistan and even India behind in the race of rapidly growing nations in terms of GDP . Pakistan can learn from the experience of neighboring country like Bangladesh.

<https://digiskills.pk/>

<https://www.erozgaar.pitb.gov.pk/>

<https://digipakistan.org/>

<https://tradingeconomics.com/bangladesh/gdp-growth-annual>

References

Adeusi, SO, & Aluko, OA (2014). *Assessing the role of Government in promoting small scale businesses in Kogi State: the Kabba/Bunu experience*. *IOSR Journal of Business and Management*, academia.edu, <https://www.academia.edu/download/36704861/M0161168692.pdf>

Agyapong, D (2010). *Micro, small and medium enterprises' activities, income level and poverty reduction in ghana-A synthesis of related literature*. *International journal of business and management*, researchgate.net, https://www.researchgate.net/profile/Daniel-Agyapong-3/publication/49586572_Micro_Small_and_Medium_Enterprises_Activities_Income_Level_and_Poverty_Reduction_in_Ghana_-_A_Synthesis_of_Related_Literature/links/02e7e5275ca0a86ebc000000/Micro-Small-and-Medium-Enterprises-Activities-Income-Level-and-Poverty-Reduction-in-Ghana-A-Synthesis-of-Related-Literature.pdf

Chreneková, M., Melichová, K., Marisova, E., & Moroz, S. (2015). *Informal employment and quality of life in rural areas of Ukraine*. *European Countryside*, 8(2), 135.

De Vries, J. (1994). *The industrial revolution and the industrious revolution*. *The Journal of Economic History*, 54(2), 249-270.

Fredrick, S. P. (2005). *The role of SMEs in thereconstruction and development of Africa*. *Ghana Club*, 100.

Fuller-Love, N., Midmore, P., Thomas, D., & Henley, A. (2006). *Entrepreneurship and rural economic development: a scenario analysis approach*. *International Journal of Entrepreneurial Behavior & Research*.

Henderson, J. (2002). *Building the rural economy with high-growth entrepreneurs*. *Economic Review-Federal*

Reserve Bank of Kansas City, 87(3), 45-75.

Jütting, J, Parlevliet, J, & Xenogiani, T (2008). *Informal employment re-loaded*. *IDS bulletin*, Wiley Online Library, <https://doi.org/10.1111/j.1759-5436.2008.tb00442.x>

Kamunge, MS, Njeru, A, & Tirimba, OI (2014). *Factors affecting the performance of small and micro enterprises in Limuru Town Market of Kiambu County, Kenya*. *International journal of scientific ...*, academia.edu, <https://www.academia.edu/download/46191940/SMES.pdf>

Larsson, E, Hedelin, L, & Gärling, T (2003). *Influence of expert advice on expansion goals of small businesses in rural Sweden*. *Journal of Small Business ...*, Taylor & Francis, <https://doi.org/10.1111/1540-627X.00076>

Maloney, W. F. (2004). *Informality revisited*. *World development*, 32(7), 1159-1178.

Mead, D. C., & Morrisson, C. (1996). *The informal sector elephant*. *World development*, 24(10), 1611-1619.

Naudé, W (2010). *Entrepreneurship, developing countries, and development economics: new approaches and insights*. *Small business economics*, Springer, <https://doi.org/10.1007/s11187-009-9198-2>

North, D, & Smallbone, D (1996). *Small business development in remote rural areas: the example of mature manufacturing firms in Northern England*. *Journal of Rural Studies*, Elsevier, <https://www.sciencedirect.com/science/article/pii/0743016796000095>

Parameswar, N., Hasan, Z., Dhir, S., & Ongsakul, V. (2019). *Factors that drive development of technological entrepreneurship in South Asia*. *Journal for Global Business Advancement*, 12(3), 429-448.

Pinchbeck, I. (2013). *Women workers and the industrial revolution 1750–1850*. Routledge.

Raj, R. S., & Sen, K. (2015). *Finance constraints and firm transition in the informal sector: Evidence from Indian manufacturing*. *Oxford Development Studies*, 43(1), 123-143.

Sternberg, R, & Wennekers, S (2005). *Determinants and effects of new business creation using global entrepreneurship monitor data*. *Small business economics*, Springer, <https://doi.org/10.1007/s11187-005-1974-z>

Sultana, H., Fatima, A., & Alam, S. (2020). *Female owned household enterprises in Pakistan*.

Tambunan, T (2007). *Entrepreneurship development: SMES in Indonesia*. *Journal of Developmental Entrepreneurship*, World Scientific, <https://doi.org/10.1142/S1084946707000575>

Tulus, T. (2009). *Women entrepreneurship in Asian developing countries: Their development and main constraints*. *Journal of development and Agricultural Economics*, 1(2), 027-040.

Xu, M., David, J. M., & Kim, S. H. (2018). *The fourth industrial revolution: Opportunities and challenges*. *International journal of financial research*, 9(2), 90-95.

Annex 1: Non-farm work by Industry

Industry code with two digits	province								Total	
	Khyber Pakhtunkhwa		Punjab		Sindh		Baluchistan			
	Count	Column N %	Count	Column N %	Count	Column N %	Count	Column N %	Count	Column N %
Agriculture, forestry and fishing	4	.0	18	.0	12	.0	3	.0	37	.0
Mining and quarrying	2	.0	0	.0	0	.0	0	.0	2	.0
Manufacturing	200	.2	485	.2	96	.1	27	.1	808	.1
Electricity, gas, steam and air conditioning supply	1	.0	0	.0	1	.0	1	.0	3	.0
Water supply; sewerage, waste management and remediation activities	3	.0	4	.0	3	.0	1	.0	11	.0
Construction	14	.0	30	.0	5	.0	2	.0	51	.0
Wholesale and retail trade; repair of motor vehicles and motorcycle	654	.5	1454	.5	579	.6	258	.7	2945	.5
Transportation and storage	264	.2	517	.2	158	.2	57	.1	996	.2
Accommodation and food service activities	22	.0	141	.0	39	.0	20	.1	222	.0
Information and communication	6	.0	4	.0	2	.0	0	.0	12	.0
Financial and insurance activities	0	.0	2	.0	0	.0	0	.0	2	.0
Real estate activities	21	.0	46	.0	20	.0	5	.0	92	.0
Professional, scientific and technical activities	16	.0	37	.0	7	.0	1	.0	61	.0
Administrative and support service activities	11	.0	17	.0	1	.0	1	.0	30	.0
Public administration and defence; compulsory social security	3	.0	0	.0	0	.0	0	.0	3	.0
Education	5	.0	43	.0	2	.0	0	.0	50	.0
Human health and social work activities	21	.0	53	.0	10	.0	2	.0	86	.0
Arts, entertainment and recreation	4	.0	11	.0	3	.0	0	.0	18	.0
Other service activities	53	.0	302	.1	62	.1	12	.0	429	.1
Activities of households as employers; undifferentiated goods	0	.0	3	.0	0	.0	0	.0	3	.0

Author's own estimations based on PSLM/HIES 2019-20

Catalysts Of Inflation In Pakistan: Twin Deficit Or Money Supply

Dominance

Raza Ali Khan 1 Talha Ahmed Siddiqui 2 Syeda Zuimah Wasim 3
Economics and Management Sciences Department, NED University of
Engineering and Technology, Karachi, Pakistan

ABSTRACT

This study examines long run and short run impacts of budget deficit, money supply, and current account deficit on inflation in Pakistan using quarterly data from 2002Q1 to 2022Q4 by applying autoregressive distributive lagged (ARDL) estimation and Granger causality test. The results confirm presence of long-term and stable impacts of budget deficit, money supply and current account deficit on inflation through ARDL bounds test. Budget deficit was found to strongly impact inflation in long run but its impact gets weaker in short run. Moreover, current account deficit and money supply are reported to exert little impact on inflation in both short run and long run. Furthermore, budget deficit and money supply were noted as key inflation drivers. It is recommended that fiscal policy should be greatly focused, budget deficit must be narrowed and money supply must be prudently controlled by increasing revenues, diversifying its exports and implementing sustainable economic policies.

Keywords: Budget deficit, inflation, money supply, Pakistan, current account balance, ARDL, Granger causality

Introduction

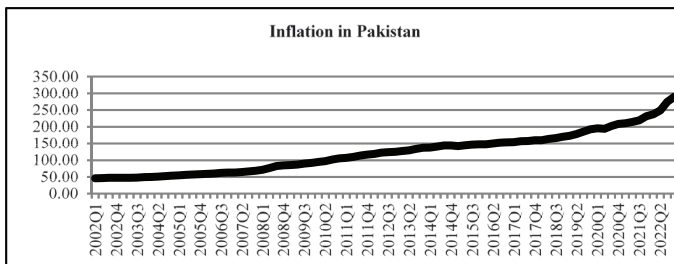
Ever growing inflation in Pakistan has garnered huge attention due to its detrimental effects on economy and lives of populace. Governments of Pakistan have tried to keep inflation low but these attempts seem to be futile given the fact that inflation has continued to escalate and currently poses a double digit figure as depicted in Figure 1. In presence of skyrocketing inflation in Pakistan, debate remains inconclusive whether demand or supply side factors are its main contributors. Thus,

demanding a dire need for this study at an opportune time especially in backdrop of present deteriorating economy and ballooning twin deficit for effective policy formulation and implementation.

Pakistan's persistently growing public debt, widening twin deficit and huge price instability has instilled interest among researchers and policymakers to deeply examine underlying causes behind rapidly rising inflation.

Corresponding author, Talha Ahmed Siddiqui- e-mail: Talhaahmed@neduet.edu.pk

Figure 1: Consumer Price Index (CPI) of Pakistan from 2002Q1 to 2022Q4



Source: (IMF, 2022)

Classical, Monetarists as well as Keynesians and Structuralists remain divided on finding main determinants of inflation. In this vein, several scholars have attempted to investigate relation among inflation, money supply and budget deficit such as (Duodu et al.,2022) in Ghana, (Nasir et al., 2020) in UK and New Zealand, (Ngyuyen, 2015) in 9 Asian countries. Furthermore, association among current account deficit, money supply and inflation has been evaluated by (Al Mutairi et al, 2020) in Kuwait, (Bilgrami & Maryam, 2022) in Asian countries and (Jadoon & Guang, 2019) but results have remained mixed and inconclusive.

Pakistan has been struggling with widening current account deficit for more than 50 years indicating serious threat to its economic viability. According to (World Bank, 2022), Pakistan's imports have constituted as lowest as 58% and as highest as 86% of total exports showing its consistently ballooned huge import bill .This massive import bill is comprised of costly capital goods and products to fulfill its energy requirements with rising

oil prices having played a crucial role in taking it to this huge level.

According to (Observatory of Economic Complexity, 2021) Pakistan's imports of crude petroleum were \$3.53 billion in 2021 making it the third largest imported product of Pakistan indicating graveness of situation. In addition to this, decline in remittances have also contributed to this current account deficit due to Covid-19 pandemic as many overseas Pakistanis lost their jobs. Moreover, Pakistan's limited export and import diversification has made it vulnerable to external factors and geopolitical situation such as witnessed by Ukraine-Russia war that has stifled its trade

Objective

This study aims to determine long run and short run impacts of budget deficit, current account deficit and money supply on inflation in Pakistan from 2002 to 2022 using quaterly data.

Research hypothesis

This paper tests following hypotheses

H1: Budget deficit causes inflation

H2: Current account deficit causes inflation

H3: Money sypply causes inflation

Contribution of this study

This is the first study ,to the best of our knowledge, that has examined impacts of all these variables namely budget deficit, current account deficit and money supply on inflation plus hardly any paper had examined causation and its direction among these variables.Hence, this study fills an important research gap. Extant literature has explored influences of either current account deficit or budget deficit on inflation such as (Alawin & Oqaily, 2017). Others had investigated only fallouts of money supply and fiscal deficit on inflation such as (Nyguyen, 2015) and (Ramu, 2014)

Second contribution of this study is that unlike earlier

researches that used annual data, this study employs quarterly data from 2002Q1 to 2022Q4 to add granularity and to depict clearer picture of nexus among these variables.

The sensitivity of this research is heightened by the fact that Pakistan's economy is fast approaching a grinding halt given currently experienced economic slowdown due to government policies, rupee depreciation, Covid-19 pandemic, inefficient tax collection, impacts of global financial crisis of 2007-08, war on terror, depressed economy and geopolitical events. Hence, this research is important as work on this topic remains under researched.

This paper is structured as follows: Section 1 presents introduction, contribution of this study to literature, objectives of study and background. Section 2 highlights literature review. Section 3 elucidates data sources and methodology employed followed by Section 4 that explains findings of this study. Lastly, Section 5 concludes, gives policy implications and future research directions

Literature Review

This section describes theories and empirical researches on nexus among twin deficit, money supply and inflation

2.1 Theoretical framework

According to classical theory, which underpins quantity theory of money, changes in nominal money supply impacts a country's inflation level. It also asserts that real output is actually influenced by inflation due to rise in nominal money supply. As a result, they see inflation as a monetary phenomenon. Monetarist theory, enrooted in quantity theory of money, elucidates that prices are determined by money supply. Its supporters claim that any variation in the money supply (nominal) from the anticipated real balance results in price fluctuation. Additionally, monetarists think that the budget deficit

affects inflation via change in money supply. This is due to the fact that a budget deficit forces government to print more money or issue government-backed securities through open market operations, resultantly, changing money supply and price levels in an economy. (Duodu, et al., 2022). High budget deficit creates crowding out effect, raises interest rates, reduces net exports, curbs private investment and consumer spending, leading to high inflation and high taxes

On the other hand, fiscal theory of price level (FTPL) clashes with monetary approach and contends that prices are actually determined by government debt and fiscal policy and not directly by monetary policy. It views government's inter-temporal budget constraint (GBC) as a tool connecting monetary and fiscal policy. GBC is said to be in equilibrium when the current amount of government debt is less than or equal to the discounted present value of future primary surpluses (tax revenue minus non-interest costs). Prices increase at a given discount rate if discounted value of primary surplus falls below nominal amount of government debt, restoring GBC to equilibrium (Javid & Arif, 2014). Hence, higher government debt generates more distortion necessitating price rise to restore GBC. FTPL has been supported by (Lozano-Espitia, 2008)

Classical and Monetarist theories explain nexus among money supply, budget deficit and inflation through quantity theory of money whereas FTPL is founded on quantity theory of government debt. Nevertheless, Keynesians claim that inflation occurs when aggregate demand exceeds aggregate supply. While, social and economic characteristics are considered as drivers of inflation in underdeveloped and developing economies by Structuralists.

Hence, researchers remain divided on determining causes of inflation which has inspired researchers both in developed and developing economies to delve and ascertain definite reasons on inflation.

Marshall Lerner condition and J curve phenomenon explain association between trade balance and prices. It advocated that balance of trade can be improved in long run if price elasticity of demand for imports and exports

becomes greater than 1 in absolute terms. Despite the fulfillment of this condition, persistent deterioration of trade balance led to introduction of J curve effect which states that trade balance first deteriorates and then improves, resembling letter J. Whenever value of currency changes, it gets depicted in two ways on trade balance: first, price and second the volume effect. Price effect gets manifested in this way that when currency depreciates imports increase in value in short run while volume of traded products might not alter considerably. Hence, resulting in worsened trade balance. Nevertheless, in case when currency devalues in future, it leads to exports outpacing imports. Thus, causing trade balance to improve (Jadoon & Guang, 2019)

2.2 Empirical literature

This section encompasses nexus among budget deficit, current account deficit, money supply and inflation as scrutinized by various strands of literature.

Budget deficit and inflation

(Duodu et al., 2022) analyzed effects of budget deficit and money supply(M2) on inflation in Ghana from 1999 to 2019 by employing Vector Error Correction Model (VECM) and established that budget deficit positively influences while money supply negatively impact inflation; thus, supporting FTPL. It claims that the financing of budget deficit through issue of government securities or printing of money creates disequilibrium in money market; hence, causing prices of products to increase sharply. Moreover, (Rehman et al. , 2021) examined determinants of inflation in Pakistan from 1960 to 2010 and concluded positive relation between inflation and budget deficit in the short run by applying Vector Autoregression (VAR) but no long run association was found between budget deficit, money supply and inflation by applying Autoregressive Distributed Lag method (ARDL). Likewise, (Ali et al., 2015) explored effects of budget deficit and money supply on inflation in Pakistan using annual data from 1960 to 2010 using

ARDL and VAR approaches. The results report an insignificant relation between these variables in long run but positive relation between budget deficit and inflation in short run. Another research by (Nguyen et al., 2022) explored influences of fiscal and monetary policies on inflation in Vietnam from 1997 to 2020 by applying VAR approach. It found that inflation is positively affected by government expenditure, fiscal deficit and money supply. In addition to this, (Durguti, 2020) inspected effects of budget deficit, GDP, government debt, unemployment and real exchange rate on inflation in Western Balkan economies from 2001 to 2017 using VECM and multivariate time series analysis. It reported that budget deficit, GDP, government debt and exchange rate positively affect inflation. Furthermore, (Sriyana, 2019) explored impact of monetary and fiscal policies in Indonesia from 1970 to 2017 by employing Error Correction Model (ECM) and reported that budget deficit, narrow money, GDP and exchange rate positively affect inflation. Hence, supporting demand-pull inflation theory. Moreover, (Ramu, 2014) found similar results when it applied ARDL in context of India by contending that when expenditures exceed revenues it leads to increase in money supply; consequently, causing inflation.

However, there are studies that contradict the findings of abovementioned researches such as (Saleem et al., 2013) in Pakistan, (Adom et al., 2015) and (Adu, 2011) in Ghana. Study conducted by (Saleem, et al., 2013) investigated relationship among inflation, fiscal deficit interest rate, GDP and unemployment in Pakistan from 1990 to 2016 and concluded that unemployment and fiscal deficit have negative association with inflation whereas GDP and interest rate have positive relation with it.

Current account deficit and inflation

The benefits that trade engenders for an economy are manifold such as trade engenders technology development due to greater competition (Gries & Redlin, 2020) boosts economic growth, curtails poverty and creates jobs. Nexus between current account deficit and

inflation is studied by multiple studies as mentioned. Study by (Mehran & Gholani, 2023) on Iranian economy examined non-linear association among inflation, current account deficit, financial balance, net foreign assets, real effective exchange rates, total investment, terms of trade, GDP per capita growth and KOF index by deploying nonlinear boundary (NARDL) approach. It confirmed the presence of co-integration between current account deficit and inflation.

(Alawin & Oqaily, 2017) found positive effect of current account deficit on inflation in short run while its adverse effect in long run in Jordanian economy. This is because long run provides sufficient time to substitute imports, hence, subduing imminent domestic inflation. Another research by (Bilgrami & Maryam, 2022) examined determinants of inflation in Pakistan, India, Bangladesh and Sri Lanka from 1980 to 2020 by using robust generalized methods of moments (GMM) technique and concluded that exchange rate and current account balance favor inflation. (Yildirim, 2022) examined nexus between current account balance and inflation in Turkish economy from 2002 to 2021 using NARDL test method and found existence of long run non-linear association between current account balance and inflation. Furthermore, (Rehman & Khan, 2015) analyzed food inflation in Pakistan from 1990 to 2013 by using VECM and Johansen co-integration test. It concluded that indirect taxes and food exports positively and significantly and positively influence food price inflation whereas GDP and government subsidies have negative relation with it.

However, contradictory findings are noted by other researchers such as by (Jadoon & Guang, 2019) that applied ARDL and reported negative association between inflation and money supply with balance of trade of Pakistan in long run. It mentioned that surge in money supply escalates inflation, increases inputs costs. Thus, making exports more expensive and less competitive in international markets.

Money supply and inflation

(Van, 2020) examined relation between inflation and money supply on Chinese and Vietnamese economies from 2012 to 2016 and found that persistent surge in money engenders inflation in long run, but continual rise in growth of money supply does not result in inflation in short run; hence, seconding, monetary quantity theory. Furthermore, (Emerenini & Eke, 2014) inspected influences of expected inflation, money supply, and exchange rate in Nigeria and concluded presence of long run association among variables by applying co-integration test. Studies such as (Dinh, 2018) , (Ujiju & Etale, 2016) and (Kumo, 2015) have highlighted that money supply influences CPI (consumer price index) because money supply is direct money quantity in circulation. In contrast, (Duodu et al., 2022) concluded that money supply has negative association with inflation in Ghana.

Methodology And Data

The purpose of this study is to investigate long and short term dynamics among budget deficit, inflation, money supply, current account deficit, GDP growth rate, interest rate and exchange rate in context of Pakistan from 2002Q1 to 2022Q4. This study has used Augmented Dickey–Fuller (ADF) and Phillips & Perron (PP) tests to check the stationarity of data. The short run and long run dynamics are analyzed using Autoregressive distributed lag (ARDL) model. The causality among variables are assessed using Granger causality test. The description of variables, data sources and empirical framework are discussed below.

3.1 Data sources and description of variables

A quarterly time series data covering the period from 2002Q1 to 2022Q4 is used by this study by obtaining data mainly from Pakistan Economic Survey and IFS (International Financial Statistics) published by Ministry of Finance, Pakistan and IMF (International Monetary Fund) respectively. The description and data sources are shown below in the Table 1

Table 1
Description of variables and data sources

Variables	Description	Abbreviation	Source
Inflation	Log of Consumer Price Index(2010=100)	CPI	International Financial Statistics (IFS)
Budget deficit	Budget deficit as a percentage of GDP	BDG	Pakistan Economic Survey
GDP Growth rate	Quarterly growth rate of Real GDP	GDP	Pakistan Economic Survey
Money Supply	Broad Money Supply as a percentage of GDP	MSP	International Financial Statistics (IFS)
Interest Rate	Quarterly Discount rate	INT	International Financial Statistics (IFS)
Current Account deficit	Current account deficit as a percentage of GDP	CRA	International Financial Statistics (IFS)
Exchange rate	Currency exchange rate per USD	EXC	International Financial Statistics (IFS)

3.2 Empirical Framework

This study explores link between inflation, money supply, budget deficit and current account deficit using control variables namely GDP growth rate, exchange rate and interest rate. The model is specified as follows:

$$INF = f(BDG, CA, MS, GDPGR, EXC, INT)$$

This research has employed ARDL estimation technique to analyze and estimate short-run dynamics and long-run relationship. The resulting model specification for short term and long term, following the work of (Pesaran et al.,2001) is as follows:

$$INF_t = \gamma_0 + \gamma_1 INF_{t-1} + \gamma_2 BDG_{t-1} + \gamma_3 CRA_{t-1} + \gamma_4 MS_{t-1} + \gamma_5 INT_{t-1} + \gamma_6 EXC_{t-1} + \beta_1 \sum_{i=1}^n \Delta INF_{t-i} + \beta_2 \sum_{i=0}^n \Delta BDG_{t-i} + \beta_3 \sum_{i=0}^n \Delta CRA_{t-i} + \beta_4 \sum_{i=0}^n \Delta MS_{t-i} + \beta_5 \sum_{i=0}^n \Delta GDP_{t-i} + \beta_6 \sum_{i=0}^n \Delta INT_{t-i} + \beta_7 \sum_{i=0}^n \Delta EXC_{t-i} + \delta_t \dots \dots \dots \text{Eq (1)}$$

Where:

β_1 = Constant

β_2 to β_8 = Short run coefficients

γ_1 to γ_6 = long run coefficients

Δ = Difference operator

n = lag lengths

δ_t = Error term

Error Correction Model is specified as follows

$$INF_t = \beta_1 + \sum_{i=1}^n \beta_2 \Delta INF_{t-i} + \sum_{i=0}^n \beta_3 \Delta BDG_{t-i} + \sum_{i=0}^n \beta_4 \Delta CRA_{t-i} + \sum_{i=0}^n \beta_5 \Delta MS_{t-i} + \sum_{i=0}^n \beta_6 \Delta GDP_{t-i} + \sum_{i=0}^n \beta_7 \Delta INT_{t-i} + \sum_{i=0}^n \beta_8 \Delta EXC_{t-i} + \omega_1 ECM_{t-1} + \mu_t \dots \dots \text{Eq (2)}$$

Where

ω_1 = Coefficient of Error correction term

μ_t = Error term

Results And Discussion

4.1 Descriptive Statistics and Correlation analysis

The descriptive statistics for the selected variables is shown by Table 2. Inflation is reported to be slightly negatively skewed with a value of -0.18 which coincides with the findings of (Hussain et al.,2021). The reason behind negative skewness of inflation is a sudden rise in price level during the last two quarters of 2022. It can be linked to rise in oil prices at international level. Whereas the remaining variables i.e. budget deficit, current account deficit, exchange rate, money supply interest rate and GDP growth are reported to be positively skewed. The pair wise correlation matrix is shown in Table 3 which portrays that GDP growth rate and current account deficit are negatively correlated with inflation while all other variables are positively correlated with the inflation

**Table 2
Descriptive Statistics**

	CPI	BDG	GDP	MSP	INT	CRA	EXC
Mean	4.688	1.496	1.821	19.255	9.813	-8.423	103.382
Median	4.816	1.3	-0.193	18.177	9.5	-8.64	101.316
Maximum	5.668	4.3	24.104	41.097	16	0.855	124.486
Minimum	3.833	0.4	-12.924	8.347	6.25	-16.058	93.179
Std. Dev.	0.521	0.809	7.553	8.218	2.619	3.584	7.488
Skewness	-0.187	1.631	1.104	0.797	0.502	0.6	1.272
Kurtosis	1.836	5.784	3.877	2.95	2.211	3.652	3.83
Observations	84	84	84	84	84	84	84

Table 3
Correlation matrix

	CPI	BDG	GDP	MSP	INT	CRA	EXC
CPI	1	0.275	-0.126	0.93	0.137	-0.48	0.218
BDG	0.275	1	-0.116	0.263	0.108	-0.137	-0.039
GDP	-0.126	-0.116	1	-0.232	-0.109	0.308	0.08
MSP	0.93	0.263	-0.232	1	0.195	-0.463	-0.029
INT	0.137	0.108	-0.109	0.195	1	-0.205	-0.581
CRA	-0.48	-0.137	0.308	-0.463	-0.205	1	-0.057
EXC	0.218	-0.039	0.08	-0.029	-0.581	-0.057	1

4.2 Unit root test

Time series analysis necessitates an in-depth evaluation of stationarity of series. Therefore, unit root tests namely ADF and PP tests are deployed to determine stationarity of variables. Table 4 reports stationarity results by employing ADF and PP tests with an assumption of intercept in the series. Because both tests revealed that the variables are of mix order integration; therefore, ARDL estimation technique will be employed to assess long run and short run relationships among variables. An important premise of ARDL technique is that variables must be integrated at level or at first difference. If any variable is integrated at second difference, then the F-test becomes invalid for making a judgement about the presence of long-run relationship.

Table 4
Unit root tests

Variables	ADF			PP		
	(at level)	(1 st difference)	Integration Order	(at level)	(1 st difference)	Integration Order
CPI	0.632	-5.06***	I(1)	4.025	-3.037**	I(1)
BDG	-1.698	-22.20***	I(1)	-5.031***	-	I(0)
GDP	-2.87*	-	I(0)	-1.384	-13.028	I(1)
MSP	0.782	-2.892*	I(1)	-7.550***	-	I(0)
INT	-2.138	-5.617***	I(1)	-1.800	-5.581***	I(1)
CRA	-2.060	-9.173***	I(1)	-2.039	-9.173***	I(1)
EXC	-1.601	-7.893***	I(1)	-1.783	-7.864***	I(1)

***, **, and * indicates stationary at 1%, 5% 10% level respectively

4.3 Lag Selection

To apply bounds testing approach of ARDL, an appropriate lag order must be selected. The selection of lag length should be done with care, since an erroneous lag length might cause problem and yield biased results which cannot be used in policy formulation. Hence, (AIC) Akaike information criterion is used to select right lag length to ensure that lag length is suitably meets criteria as mentioned by Pesaran et al. (2001) and Narayan & Narayan (2005). When compared to other criteria, the AIC gives robust results with efficient performance. Table 5 summarizes these findings. According to AIC criterion, lag 7 is appropriate for sample selected for this study. Furthermore, polynomial graph in Figure 2 provides validation for identifying a suitable lag duration under VAR technique. All of the blue dots in this graph are inside the circle, indicating that estimations would be suitable at lag 7.

Figure 2: Polynomial graph showing inverse root of AR characteristics

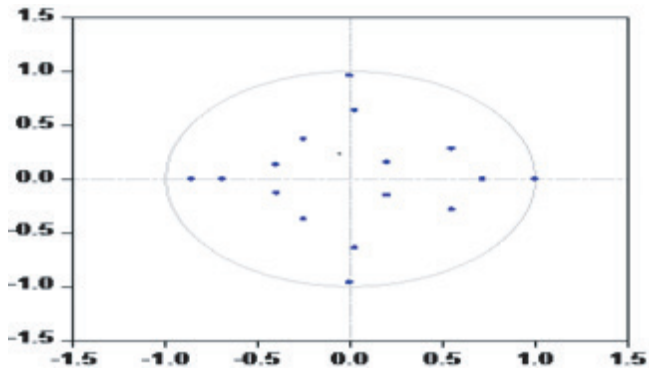


Table 5
Selection criteria for Lag order

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-1169.618	NA	44195.920	30.562	30.775	30.647
1	-561.779	1089.375	0.022	16.046	17.75*	16.72*
2	-493.384	110.143	0.014	15.542	18.739	16.821
3	-421.962	102.032	0.008*	14.960	19.648	16.835
4	-373.307	60.660	0.010	14.969	21.148	17.441
5	-325.171	51.262	0.013	14.991	22.662	18.060
6	-269.053	49.558	0.017	14.807	23.969	18.471
7	-167.998	70.86949*	0.009	13.45450*	24.108	17.716

Note: *denotes the lag order selected by the criterion

4.4 Bound test

To apply ARDL approach, first presence of a long-run relationship between among research variables is assessed and then *F*-statistics of unconstrained ARDL findings is matched with critical values of bound test (Pesaran test). Second, if the long-run link between research variables is proved, then long-run relationship coefficients are estimated. The ARDL technique is used to estimate coefficients of this relationship. The constrained or Error correction model (co-integration) is then calculated.

Table 6 summarizes outcomes of co-integration test performed using ARDL bound testing approach. The calculated *F*-statistics is 5.328, which exceeds lowest and upper bounds for 1%, 2.50%, 5%, and 10% critical values. The bound test findings reject null hypothesis asserting no co-integration since it exceeds the critical thresholds. The bound test findings reveal that variables namely inflation, budget deficit, interest rate, money supply, GDP growth rate and current account deficit have a long-run relationship.

4.5 Short-run and Long run analysis

The study established long-run co-integrating association between inflation and its determinant Now under this section, this study shows presence of long-run and short-run elasticities

Table 6
F-Bounds test

F-statistic	5.328736	
Significance level	I(0)	I(1)
10%	1.75	2.87
5%	2.04	3.24
2.50%	2.32	3.59
1%	2.66	4.05

using Equations 1 and 2. For the long-run results as presented in Table 7, all explanatory variables positively and significantly affected inflation except GDP growth rate which turns out to be negative and insignificant.

The long-run impact of budget deficit on inflation is positive and statistically significant. An surge of 1% in budget deficit leads to about 27% surge in inflation. These results are consistent with findings reported by (Duodu et al, 2022) in Ghana and (Sriyana, 2019) in Indonesia (Durguti, 2020) in Western Balkan states. This is because by printing more money or issue of government bonds unsettles money market drastically, consequently, causing prices to see upward trajectory.

Similarly, money supply is positively and positively related to inflation. It is found that a 1% growth in money supply increases inflation by 5.5%. Hence, endorsing quantity theory of money advocated by classical theorists These findings are consistent with researches by (Van, 2020) and (Emerenini & Eke, 2014) .This is because when money supply rises, demand for products by consumers also grows concurrently. Hence, they end up bidding prices up , subsequently, fueling inflation.

Similarly, inflation will escalate by 6.6% percent, 2.5% and 2.7% due to a 1 % rise in interest rate, current account deficit and exchange rate respectively.

Table 7
Long run coefficients

Variable	Coefficient	Stand Error	t-Statistic	Prob.
BDG	0.267**	0.124	2.143	0.038
GDP	-0.003	0.003	-0.985	0.330
MSP	0.055***	0.004	13.555	0.000
INT	0.066***	0.020	3.230	0.002
CRA	0.025***	0.010	2.469	0.017
EXC	0.027***	0.001	21.228	0.000

The results of the short-run coefficients of ARDL are shown in Table 8. The sign and coefficient related to ECM (error correction term) are the most essential features of short-run model. In event of a short-run shock, it reflects convergence towards equilibrium. An effective ECM term, according to Banerjee et al (1998), provides crucial evidence for building a stable long-term connection among variables. In model of this study, the ECM term is -0.075, which is negative and statistically significant at 1% level of significance. The magnitude of error correction term is not very high showing a modest adjustment towards long-run equilibrium.

The budget deficit has a positive and significant result with the inflation in the short run as well. These results are aligned with results found by study by (Rehman & Khan, 2015) carried out in Pakistan.

The money supply was noted to have negative relation with inflation though with a lag from the fifth quarter and onwards. The same results were found by (Aimola and Odhiambo,2021) and (Van, 2020) that found positive money supply-inflation long run relation but a negative one in short run.

The results further show that if current account deficit rises by1%, it will lead to 0.01% decrease in inflation after the fourth quarter. This conclusion contradicts what was discovered for the long term effect of the current account deficit. In particular, an increase in the current account causes inflation to rise in the long run as noted by (Yıldırım,

2022) but fall in the short run. Current account deficit is result of surge in imports compared to those of exports; hence, resulting in imported inflation. The result is in contradiction with the findings of (Alawin & Oqaily, 2017). The exchange rate was found to have a minute impact on inflation after fifth quarter.

Table 8
Short run coefficients

Variable	Coefficient	Standard Error	t-Statistic	Prob.
Constant	0.081	0.010	8.449	0.000
D(CPI(-1))	-0.033	0.111	-0.297	0.768
D(CPI(-2))	-0.237	0.120	-1.985	0.054
D(BDG)	0.006	0.002	3.325	0.002
D(BDG(-1))	-0.012	0.003	-4.635	0.000
D(BDG(-2))	-0.008	0.002	-3.560	0.001
D(GDP)	-0.001	0.000	-2.499	0.017
D(GDP(-1))	0.003	0.001	5.363	0.000
D(GDP(-2))	0.002	0.001	4.328	0.000
D(GDP(-3))	0.001	0.001	2.602	0.013
D(GDP(-4))	0.002	0.000	3.852	0.000
D(MSP)	-0.001	0.002	-0.362	0.720
D(MSP(-1))	0.002	0.002	1.436	0.159
D(MSP(-2))	-0.006	0.002	-3.771	0.001
D(MSP(-3))	-0.006	0.002	-4.033	0.000
D(MSP(-4))	0.001	0.002	0.488	0.628
D(MSP(-5))	-0.007	0.002	-3.541	0.001
D(INT)	0.009	0.001	6.954	0.000
D(INT (-1))	0.000	0.002	0.088	0.931
D(INT (-2))	-0.004	0.001	-2.990	0.005
D(EXC)	0.001	0.000	3.138	0.003
D(EXC (-1))	0.000	0.000	-0.229	0.820
D(EXC (-2))	0.000	0.000	-1.026	0.311
D(EXC(-3))	0.000	0.000	-0.079	0.937
D(EXC(-4))	0.000	0.000	0.201	0.841

4.6 Diagnostic tests

Multiple diagnostic tests were used to assess model stability, including Jarque-Bera normality test, LM serial correlation test, and BG Pagan heteroscedasticity test. The results are shown in Table 9. The selected models passed all of the diagnostic tests, according to results. Additionally, this study investigated long- and short-run parameter stability using two stability tests namely CUSUM and CUSUMSQ. Brown et al. (1975) and Pesaran and Shin (1999) proposed these stability tests. Figures 3 and 4 depict graphs of both stability tests demonstrating that plots for both stability tests are within critical boundaries.

Test	Test statistic	Probability
LM Test	0.063	0.939
BG Pagan Test	1.302	0.2074
Jarque-Bera	0.106	0.948

Figure 3: CUSUM

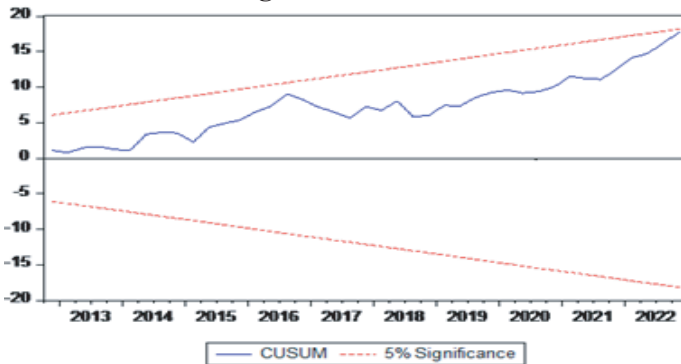
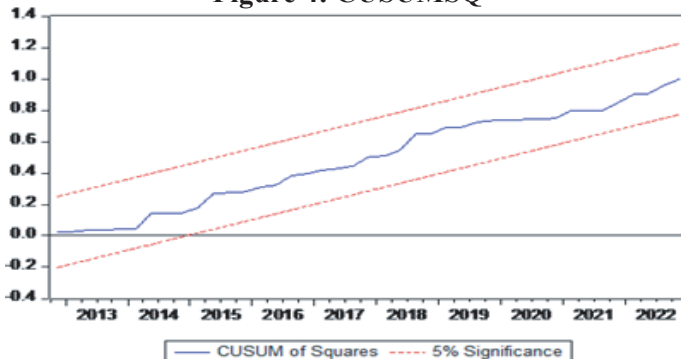


Figure 4: CUSUMSQ



4.7 Granger Causality test

Granger causality test is employed to assess causation between variables after establishing co-integration among variables. It is assumed that unidirectional or bidirectional causation exists between the series if co-integration is examined among variables. The results of the pairwise granger causality test are shown in Table 10 below.

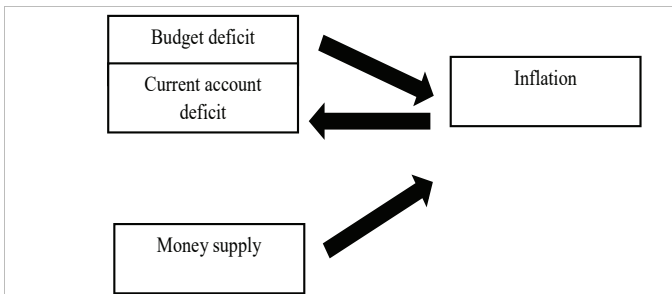
Table 1
Description of variables and data sources

Dependent Variable	Independent Variable	F-Statistics	Probability	Existence of Causality
Budget deficit	CPI	5.386	0.000*	Yes
CPI	Budget deficit	0.824	0.536	No
Money Supply	CPI	2.717	0.020*	Yes
CPI	Money Supply	0.233	0.964	No
Current Account Deficit	CPI	0.615	0.689	No
CPI	Current Account Deficit	4.518	0.000*	Yes

** indicate rejection of null hypothesis at 5% level of significance*

The results of granger causality test show unidirectional relation among inflation, budget deficit, money supply and current account deficit as portrayed in Figure 5 below. The budget deficit and money supply are found to cause inflation. Hence, accepting hypothesis 1 and 3 but inflation does not cause budget deficit and money supply. Whereas inflation causes current account deficit but current account deficit does not cause inflation; thus, rejecting hypothesis 2

Figure 5: Results of Granger causality pictorially depicted



Conclusion, Policy Implications And Future Researches

Using quarterly data, this study attempts to investigate variables that may have contributed to inflation in Pakistan by utilizing ARDL co-integration technique. The findings suggest that there is a significant and positive connection between budget deficit and inflation in long run. Therefore, in long run, fiscal deficits are inflationary in Pakistan. Results also note that money supply, current account deficit, and exchange rate have slight impact on inflation whereas the impact of GDP growth rate is insignificant in long run. As a result, it is concluded that inflation in Pakistan is more of a fiscal problem rather than a monetary phenomenon.

On the premise of abovementioned results it is recommended that in order to subdue crippling effects of high and persistent inflation in Pakistan government authorities and policymakers should intensify their anti-inflation efforts through implementation of stringent fiscal policy and serious efforts must be directed to lessen the ever burgeoning budget deficit. This can be done by increasing its revenues by expanding tax net and reducing debt servicing by relying on internally generated funds. In addition to this, Pakistan must diversify its export baskets and markets so its exports are not sensitive to external shocks. Moreover, imports of some products should be reduced and must be substituted with domestically produced products in order to curtail its current account deficit. Furthermore, sound, stable and sustainable economic plans must be formulated and implemented in letter and spirit. These steps can decrease current account deficit and subsequent inflationary pressures arising from it.

Future researchers can undertake similar study by doing a comparative assessment of Pakistan and other developing economies such as SAARC (South Asian Association for Regional Cooperation). Furthermore, monthly data can be employed to evaluate this same study and comparison and contrast can be highlighted.

Disclosure: *There are no conflict of interests among authors.*

References

- Adom, P. K. et al., 2015. Analysing inflation dynamics in Ghana. African Development Review, 27(11), pp. 1-13.*
- Adu, G., 2011. Determinants of inflation in Ghana: An empirical investigation. South African Journal of Economics, 79(3), pp. 251-269.*
- Al Mutairi, A., Al-Abduljader, S. & Naser, K., 2020. Determinants of inflation in Kuwait. The Journal of Developing Areas, 54(3).*
- Alawin, M. & Oqaily, M., 2017. Current account balance, inflation and sustainable development in Jordan. Revista Galega de Economia, 26(3).*
- Ali, A., Jan, F. A. & Khan, S. U., 2015. Relationship between inflation and other macro economic variables in Pakistan. Journal of Management Info, 2(4), pp. 6-15.*
- Bilgrami, S. R. & Maryam, S. R., 2022. Determinants of inflation in Pakistan, India, Bangladesh and Sri Lanka: A panel data analysis.. Journal of Human Behavior and Societies, 1(1), pp. 1-9.*
- Dinh, D., 2018. World crude oil prices impact on consumer price index. Advances and Applications, 52(1), pp. 33-54.*
- Duodu, E., Baidoo, S. T., Yusif, H. & Frimpong, P. B., 2022. Money supply, budget deficit and inflation dynamics in Ghana: An empirical investigation. Cogent Business & Management, Volume 9, p. 2043810.*
- Durguti, E. A., 2020. How does the budget deficit affect inflation rate–Evidence from Western Balkans countries. International Journal of Finance & Banking Studies, 9(1), pp. 1-10.*
- Emerenini, F. & Eke, C., 2014. The impact of monetary policy rate on inflation in Nigeria. Journal of Economics*

and Sustainable Development, 5(281), pp. 146-153.

Gries, T. & Redlin, M., 2020. Trade and Economic Development: Global Causality and development- and openness-related heterogeneity2. *International Economics and Economic Policy*, 17, Volume 17, pp. 923-944.

Haque, N. U. & Jalil, A., 2020. *The cost of disinflation: The sacrifice ratio, s.l.: PIDE Knowledge Brief.*

Hussain, M., Awan, R. U. & Abbas, A., 2021. A Nonlinear Causality between Inflation Uncertainty and Stock Returns: Evidence from Pakistan.. *IIIE Journal of Economics and Finance*, pp. 74-84.

IMF, 2022. *Access to macroeconomic and financial data.* [Online] Available at: <https://data.imf.org/?sk=388dfa60-1d26-4ade-b505-a05a558d9a42> [Accessed 2023].

Jadoon, A. u. & Guang, Y., 2019. The effect of exchange rate fluctuations on trade balance of Pakistan. *International Journal of Economic Sciences*, 8(1), pp. 68-80.

Javid, A. Y. & Arif, U., 2014. Fiscal and monetary regime identification for price stability in case of Pakistan's economy. *Journal of Economic Cooperation and Development*, 35(3), pp. 43-70.

Kumo, W., 2015. "Inflation targeting monetary policy inflation volatility and economic growth in South Africa. *African Development Bank Group Working Paper*, Volume 216, pp. 1-33.

Lozano-Espitia, I., 2008. Budget deficit, money growth and inflation: evidence from the Colombian case. *Borradores de Economía*, Volume 537, pp. 1-25.

Mehran, M. & Gholani, A., 2023. *Current account*

dynamics in Iran: An intertemporal approach. International Journal of Political Economy, 4(1), pp. 273-302.

Nasir, M. A., Lorente, D. B. & Huynh, T. L. D., 2020. Anchoring inflation in xpectations in the face of oil shocks & in the proximity of ZLB: A tale of two targeters. Energy Economics, Volume 86, p. 104662.

Nayab, D.-e. & Siddique, O., 2021. Exchange rate policy must seek undervaluation. The Pakistan Development Review, 60(1), pp. 85-91.

Nguyen, T. T., Phan, T. D. & Tran, N. A., 2022. Impact of fiscal and monetary policy on inflation in Vietnam. Investment Management and Financial Innovations, 19(1), pp. 201-209.

Nynguyen, B., 2015. Effects of fiscal deficit and money M2 supply on inflation: Evidence from selected economies of Asia. Journal of Economics, Finance and Administrative Science, Volume 20, pp. 49-53.

Nynguyen, B., 2015. Effects of fiscal feficit and money M2 supply on inflation: Evidence from selected economies of Asia. Journal of Economics, Finance and Administrative Science, Volume 20, pp. 49-53.

Observatory of Economic Complexity, O., 2021. Crude Petroleum in Pakistan. [Online] Available at: <https://oec.world/en/profile/bilateral-product/crude-petroleum/reporter/pak2> [Accessed 2023].

Oqaily, M. A. a. M., 2017. Current account balance, inflation, industry and sustainable development in Jordan. Revista Galega de Economia, pp. 45-56.

Ramu, A. M. R., 2014. Relationship between fiscal deficit and inflation in India: a long term empirical analysis. The Indian Economic Journal, 62(31), pp. 1099-1120.

Rehman, F. U. & Khan, D., 2015. *The determinants of food price inflation in Pakistan: An econometric analysis. Advances in Economics and Business*, 3(12), pp. 571-576.

Rehman, S. et al., 2021. *Relationship between Inflation and Other Macro Economic Variables in Pakistan. Ilkogretim Online*, 20(5), pp. 7770-7785.

Saleem, F. et al., 2013. *Determinants of inflation in Pakistan. Interdisciplinary Journal of Contemporary Research in Business*, 4(9), pp. 245-252.

Sriyana, J., 2019. *Inflationary effects of fiscal and monetary policies in Indonesia. Business and Economic Horizons*, 14(3), pp. 674-688.

Ujiju, L. & Etale, L., 2016. *Macroeconomic analysis of the relationship between monetary policy. International Journal of Business and Management*, 4(6), pp. 31-39.

Van, D. D., 2020. *Money supply and inflation impact on economic growth. Journal of Financial 2Economic Policy*, 12(1), pp. 121-136.

World Bank, T., 2022. *World Bank Indicators. [Online] Available at: <https://databank.worldbank.org/source/world-development-indicators#> [Accessed 2023].*

World Bank, T., 2022. *World Development Indicators. [Online] Available at: <https://databank.worldbank.org/source/world-development-indicators> [Accessed 2023].*

Yildirim, Y. V. E., 2022. *The asymmetric effects of the current account balance on inflation: A NARDL approach for Turkish economy. Ekonomski*

Catalysts Of Inflation In Pakistan: Twin Deficit Or Money Supply

*vjesnik/Econviews-Review of Contemporary Business,
Entrepreneurship and Economic Issues, 35(1), pp. 87-97.*

Link of Energy Consumption, FDI, Urbanization and GDP with Carbon Emissions: A time series analysis of Pakistan

Dominance

Syed Mujtaba Ali Nizami , Noman Saeed and Khurram Iftikhar

ABSTRACT

Pakistan is facing issues regarding environmental conditions in the region. In this research, see the long-term relationship of carbon emissions with foreign direct investment, trade openness, urbanization, and gross domestic product of Pakistan. Taking data of Pakistan from 1976-2018 from World Development Indicators. Now world is realized that environmental issues will be affecting the developing countries in the world. Most of the developing countries facing the problems which are causing due to environment. In this study, econometric techniques and methods were used for the empirical evidence. In this research work, the ARDL co-integration technique was used. Firstly, check the stationarity of the variables, then use co-integration, the error correction model, the bound test, the LM test for autocorrelation, the CUSUM square, and the CUSUM test for checking the stability of the model. Findings are showing that the long-run positive association of carbon emissions with FDI, GDP, EC, and UP. On the other side the long-run negative association of Carbon Emissions with trade openness. In the light of findings of results, we can say that more effective policy making and implantation of the policies regarding environment is fruitful for the country like Pakistan.

Keywords: *EC, FDI, Urbanization, TO, GDP and Carbon Emissions.*

¹ M Phil student at Applied Economics Research Center, University of Karachi.

¹ Research Economist, Applied Economics Research Center, University of Karachi.

¹ Corresponding Author ,Research Economist, Applied Economics Research Center, University of Karachi

Introduction

The world has been dealing with the issue of global warming in recent years as a result of an increase in carbon emissions worldwide. Pakistan is the nation most impacted by global warming. Following the industrial revolution, using fossil fuels in industry and automobiles led to a sharp rise in greenhouse gas (GHG) emissions into the atmosphere. These gases have a long half-life and a high warming potential, which allows them to continue warming for decades or even centuries. The worldwide temperature rose by 0.76°C over the twentieth century, while Pakistan's temperature rose by 0.6°C in the first ten years of the century.

Human activity has a significant impact on the nearby environment, which frequently has disastrous consequences due to its negative repercussions and, on rare occasions, results in the total annihilation of the surrounding natural ecosystem. Climate change is one of today's most pressing global challenges, and it is primarily caused by the use of fossil fuels such as coal, oil, and natural gas. According to the Intergovernmental Panel on Climate Change (2007), this process increases greenhouse gas emissions, specifically CO₂. Pakistan is a nation with extremely low environmental law and policy implementation. These are the reasons that rising energy consumption, global trade, population growth, urbanization, and CO₂ emissions are disturbing the environment. major issues brought upon by the aforementioned elements. Less effective use of these resources is the cause of this. Although they are increasing, economic activity is not running smoothly. At the same time, economic and commercial activity is increasing wealth and revenue, but the national environment is bearing the burden of these developments. The goal of businesses and households is to become wealthier and earn more money. They don't consider environmental preservation or the negative effects of the sharp rise in economic activity on the environment. The primary causes of this situation are a lack of knowledge and an absence of rules and laws.

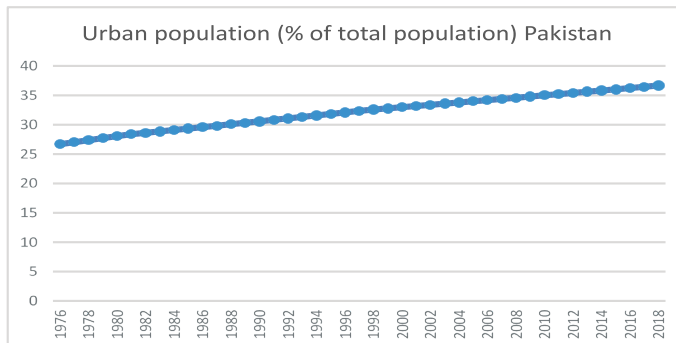
Urbanization is one of the fastest-moving societal

changes in the modern world. This phenomenon is brought about by the daily migration of significant numbers of people to cities who are motivated by a variety of social and economic reasons. In general, urbanization boosts income, productivity, and economic opportunities while also stimulating innovation, which alters the political, scientific, and artistic landscapes (Stewart and Lee 1986; Bloom et al. 2008; Glaeser 2011). Anyway, due to urbanization social problems make worse such as poverty, crime, marginalization, and environmental deterioration, as well as promotes disease transmission (Bloom et al. 2008).

Pakistan is the most urbanized country in South Asia. In the findings of Population Census of Pakistan 2023, population has increased with the growth rate 2.55% Annually. According to the facts and figures have given by PBS (Pakistan Bureau of Statistics), rural population is 61.18% of the total population and while urban population is 38.82%. Prediction of UN population division for Pakistan is that over half of the population will live in urban areas by 2025.

Positive Association of Economic Boom and Urbanization in mostly industrialized countries, where urban population is increase due to economic boom. According to the calculation cities generate more than 80% of global GDP. In the areas where population density is high in urban areas where more job and business opportunities and high per capita income. Economic Boom and technological enhancement have positively affected to the urbanization.

Figure 1: Urban Population of Pakistan



The following data illustrates the proportion of Pakistan's total population that resides in urban regions between 1976 and 2018. The trend shows a steady rise in urbanization, with the percentage of people living in cities growing from 26.681% in 1976 to 36.666% in 2018. This indicates a substantial shift in the country's lifestyle toward urban living over the years, with implications for social, economic, and infrastructure changes. Factors like industrialization, economic development, and migration from rural to urban areas are frequently correlated with urbanization. The growing urban population presents both opportunities and difficulties for governments to solve concerns with housing, jobs, infrastructure, and environmental sustainability. Comprehending and evaluating this urbanization trend might offer valuable perspectives on Pakistan's demographic patterns and contribute to the formulation of sustainable urban development plans for the future.

The nation is becoming more urbanized, which is leading to rural-to-urban migration. because of the national trend toward urbanization, which is brought about by rural-to-urban migration as a result of urban pull factors like job opportunities and other amenities. They are prepared for any kind of task, even when they are unaware of how dangerous it may be. That is among the causes of it. One of the main reasons for environmental disturbance in the country's rural areas is the lack of development in these areas.

Over half of the world's population lives in urban areas, according to a 2014 UN estimate, and by 2050, that number is expected to rise to 70%. 90% of the world's urban expansion in the continent of Africa and Asia expected, where the majority of this urbanization is anticipated to take place. Given that their combined urban population is expected to account for 37% of the global urban population by 2050, India, China, and Nigeria are well-positioned to lead this trend of urbanization. Notably, the World Bank calculated that 50.84% of Nigerians lived in urban areas in 2013. In academic debate, urbanization is increasingly acknowledged as a critical element influencing

emissions.

According to researchers like Hossain (2011), Sharma (2011), and Farhani et al. (2013), energy consumption, trade, income, and urbanization are some of the factors that affect emissions when they are considered an independent exogenous variable. The growing number of people living in cities tends to increase energy consumption, which in turn promotes economic growth and increases trade with other countries, both of which increase CO₂ emissions.

The ecology will benefit if we work on free trade agreements (Werner Antweiler, 2001). (Liddle, 2001). However, the issue with free trade agreements is that they do not promote mutual benefit because the participating countries have divergent goals and motivations. We occasionally see that although free trade benefits the environment, it causes numerous issues for the nations involved. Trade has increased people's wealth levels in developing nations, giving them the power to demand stricter environmental protection laws. When businesses that create commodities with high levels of pollution are subject to stricter environmental regulations in emerging nations, they relocate to areas with lower environmental requirements. Regarding Pakistan's economy, the country's informal sector means that the government has no control over Environmental Regulations. As a result, many international businesses invest there because the country's environmental requirements are lax.

Main reason of mobility of capital is Legislation regarding environment. When country's environmental standards start to high, it causes mobility of the capital from high environment standard country to low environment standard country. One of the reasons behind FDI and capital mobility is tighter environment policies. This kind of investment we see in the world, many of developed countries import pollution intensive goods from the developing and under developing countries, and where they build plants and factories where environmental standards are very low. Another thing is that into the developing countries and under developed countries FDI ratio is increasing, in these countries investors production cost is low and they are easily to

increase the profit of him and other way they are causing to increase the economic activities in developing and under developed countries. This is because of economy of scale. Due to tighter environmental standards and environmental taxes his cost is to produce polluting intensive goods is increasing they are finding the destinations where environmental standards are very low, they are investing in which countries where environmental standards are low, FDI is initially helpful for developing and under developed countries to boost up the economy. In many countries we see that FDI play a vital role in to improving the macro-economic variables. In Bangladesh FDI brings boom into his economy, due to this increasing in employment opportunities and economic activities. FDI is used as a tool to boost up the economic activities and employment opportunities, but in beginning country may bear the environment cost. Due to FDI and capital mobility is affecting the international trade, because due to mobility of capital and FDI increasing towards developing and less developed countries, in which countries environmental standards are high, they are import the goods from the developing and under developed countries. Linkage of international trade and FDI is the real phenomena into all over the world is proven. When economy moves towards growth and they are able to adopts the advance technology and producing goods on advance level where they are achieved the economies of scale and they are producing goods on large scale Economic expansion affects quality of environment through three effects: scale effects, technology effects, and composition effects (Krueger, 1991). When economy is growing and developing, we see that structural changes come into the economy and economy is able to produce goods on large scales where their cost is to minimize and profit is to maximize. Then they are thinking about to prevent his environment from different types of pollutions and used the efficient production techniques in their production methods. Its recent example is that the use of solar energy system and fuel free transport vehicles. Relationship between CO2 emissions and growth is inverted U Shaped, in beginning of when economy is in initial stage CO2 emissions

increasing with decreasing rate, but when CO₂ emissions in go to his peak and declining after it when income is increasing manners. According to Economic Survey of Pakistan 2017-2018 the use of energy by kinds is household, commercial, industrial and agriculture. Mostly consumption of energy by household which is 51% in 2018, commercial is 8%, industrial is 25% and agriculture is 10%. This is showing the contribution of household into CO₂ emissions is more than the commercial and industrial sectors.

Objective of research is that to see the impact of FDI, Urbanization, GDP per capita and Trade openness ratio on CO₂ emissions per capita in the context of Pakistan economy and Pakistan environmental conditions. Pakistan is one of effected countries by global warming. These independent variables mostly affect to the environment. To check these variables are causing to disturb the environment in real manners or not. In this research paper we are taken 43 years data which is show that linked between CO₂ emissions per capita and energy consumption, FDI, GDP, Urbanization and Trade openness ratio of Pakistan. We are seeing in this research paper these variables (independent) are causing to increase in CO₂ emissions or not, and there is a long run association among the variables exists or not.

Literature Review

In the finding through data in which 1% rise in GDP growth causing to increase carbon emissions by 0.84% and other side growth of 1% energy intensity causing emissions increased by 0.24%. According to the co-integrating vector findings adjusted for GDP growth, the coefficients of EI growth and CO₂ emissions growth have a substantial and positive influence on the level of development of 0.3% and 1.2%, respectively. This demonstrates that Pakistan's economic development is dependent on energy consumption, and that CO₂ emissions led to considerable and positive economic growth. The finding prove that the consumption of energy

is inefficient has a negative influence on environmental quality. Adopt energy efficient technology for both production and consumption. These methods would help the environment, boost long-term productivity, and save energy.

As income increases, individuals want to achieve advanced modern way of living and become more concerned with the environmental quality of their surroundings. This heightened create demand for a better environmental quality drives technological changes in the economy, which typically reduces environmental degradation. When talking about EKC, the most popular thing that is discussable is that the country goes toward adoption of modern living methods, and people are highly concerned regarding environmental amenities (Pezzey, 1989; Daqing, 1994; Baldwin, 1995). During the preliminary stages of economic growth, pollution grows faster than income, but as the economy continues to develop, pollution grows more slowly relative to GDP. Connection of economic development and environmental quality described systematically in EKC.

The inverted U connection receives its name from the work of Kuznets (1955). In H O theory describe about the specialization in developing countries in to the factor abundance products (which is may be labor intensive goods) and developed countries specialization into factor abundance (which is may be the capital abundance products) under free trade agreements which is effect by the international trade. If free trade is occurring into the world all countries produce about his specialization and trade with each other. Free trade agreements have a positive impact on the environment and strengthen the role of developing countries in producing labor-intensive goods and services globally (Grossman and Krueger, 1991; Bandyopadhyay, 1992; al, 1996); Chapman, 1998; Cole, 2003; Cole, 2004; Hooi Hooi Lean, 2010); Sharma, 2011; Hussain, 2012; Kohler, 2013; Kiviyiro, 2014; and Baek, 2015). The work by Halicioglu (2009) was the first to empirically include the trade openness ratio variable into econometric calculations of the Environmental

Money supply and inflation

Kuznets Curve (EKC). When economies are developed and enter into the growing stage and his wealth is increasing, they are able to consume on Research and Development that the reason behind it developed countries is Capital abundant countries. They are discovered new innovations which is very beneficial for the society. International trade promotes the diffusion of clean technology (Martin, 1992); Reppelin-Hill, 1999).

(PANAYOTOU, 1997) Taking the facts and figures of 30 developed and developing homelands during the time period of 1982 to 1994 calculate a decomposition equation through these facts and figures. He is indicating that policies regarding income and environment linkages. If you break it down more specifically, like size, sectoral mix, and pollution intensity impacts. According to his findings indicating that effective laws and institutions have an important role to reduce pollution and carbon emissions at low-income levels, and this accelerates as wealth increases.

Researchers discover that many impoverished countries concentrate in polluting-intensive commodities, whereas rich countries specialize in anti-polluting goods that do not disrupt their consumption habits. Poor countries export damaging items, while wealthier countries import them (Saint Paul, 1994). In the factor endowment hypothesis, trade patterns are opted by a country, which is indicating the wealth condition of a country. Many countries have a specialty in both labor-intensive and capital-intensive products; on the other side, pollution-intensive goods production required significant capital investment (Antweiler et al., 2001; Cole and Elliott, 2003).

Another perspective on the import and export of harmful commodities, stringent environmental laws in industrialized nations, they levy large taxes on polluting intensive items because this businessman fly his capital in countries where environmental standards are low (Adam B Jaffe, 1995); Mani and Wheeler, 1998). When we look at industrialized countries, we observe that the government encourages the production of less polluting

items by investing in research and development projects. As a result, they have developed new ideas and strategies to improve the country's output while reducing economic pollution levels. The policymakers created policies to protect their ecology and climate. That is why, in industrialized countries, the sickness ratio attributable to pollution is decreasing.

International trade facilitates the spread of clean technology (Martin and Wheeler, 1992; (Reppelin-Hill, 1999). Environmental institutions are crucial for protecting the environment by implementing effective policies. Numerous studies have examined the relationship between total energy consumption and environmental quality. For example, Matthew Cole (1997) and Suri and Chapman (1998) found that energy consumption tends to be lower in developed countries compared to less developed countries. Urbanization is another element that contributes to higher energy use. This is caused by inefficient energy utilization. Urbanization causes demographic changes in the country. Urbanization is attracting people to migrate from rural to urban areas for jobs, work, and other services like education and health facilities. They are more commonly eaten in metropolitan areas due to the increased demand for energy-intensive commodities. For example, in recognition of the relevance of urbanization to socioeconomic growth, the Chinese government changed urbanization policy during the economic reform era, significantly increasing urbanization (Neill, 2004).

Another difference between established and developing economies is that both have formal economies. ACT (2001) analyses three possibilities in their research. If country have a weak regulation regarding environment where free trade increase carbon emissions if country have a competitive advantage in production of pollution intensive goods. The formal economy allows the government to quickly identify who produces harmful commodities. Who produces harmful items if government policy is to reduce pollution? It may be levying large charges on damaging products production. According to Susmita Dasgupta (2002), environmental regulation and enforcement rise with income, with the greatest increases

occurring at low to middle income levels. Increased regulations are expected as returns fall. When formal controls are insufficient, polluting-intensive commodities are produced through alternate routes, such as local manufacturers. The ensuing pollution equilibrium reflects the community and plant's respective bargaining power (Wheeler, 1996).

Another problem is the Race to Bottom between the economies, the relocation of investment and manufacturing practices from developed countries to less developed countries will place their environmental requirements high. To maintain their growth and development they are sacrifice the investment. Due to these developing countries have a chance to develop his structure and patterns of production through adopting new techniques of production.

Lopez (1994) employs a general theoretical framework to demonstrate that if producers bear the social marginal cost of pollution, what is the link between CO₂ emissions and per capita income? It is determined by the sort of technology employed, as well as societal interests and tastes. Lopez's model included the terms "homothetic" and "non-homothetic." The term "homothetic" refers to a function of two or more variables in which the ratio of the partial derivatives is determined solely by the ratio of the variables, not their value, and the ratio of commodities sought by the ratio of their prices.

If nations preferences are homothetic means that they demanding the goods which is causing to increase in the pollution, peoples are spending on pollution intensive goods and if preferences of peoples are non-homothetic it means that they are spending on less polluting intensive goods and their income is rising and they have wanted a better environment.

Theoretical Framework and Model Specification

Firstly, when we are talking about the theoretical framework and background of trade and environment relationship we are first describing the EKC theory. In 1955 (Kuznets, 1955) find the relationship between Environmental degradation and per capita income, he finds that when economy is in its initial way environmental degradation increasing time by time but at a time when economy is goes on a peak, when income level is high of this country environmental degradation starts to declining. EKC present inverted U-shaped Environmental Kuznets Curve. Kuznets proved that relationship between CO₂ emissions and level of income of country's residents. In many other cases mostly in the developed countries cases EKC results are proved. But when we are talking about developing and under developed country's (because they are in an initial developed stages of economy) CO₂ emissions are high because in these countries people's per capita income is low that why in these countries CO₂ emissions is high in respect to developed countries where peoples per capita income is high if we compare it to developing and under developed countries. There are many reasons behind the low per capita income. Mostly low per capita income country's economies are the agricultural economies. In these countries peoples living standards and other social services are very poor. Literacy rate, poverty, health facilities and other social indicators not present good picture of these countries. When we talk about human development, they have less developed and many people mostly work in the agriculture sector. Another quality of these countries, they are labor surplus country's population of these country's is increasing with a high ratio if we are relating it to the developed country's rate of increase in population. Theoretically is proved EKC relationship between co₂ emissions and per capita income.

Another variable we are taking in the model is energy consumption. Energy consumptions per capita are high in developing and under developed countries. Due to inefficient allocation of resources in these countries CO₂

emissions is increasing. Positive relationship find in the developing countries between CO₂ emissions and energy consumptions is proved theoretically.

Most rising and underdeveloped countries rely heavily on coal and oil to generate their energy. Which is the most harmful to the environment and generates pollution. That is only due to wasteful use of technology, whereas wealthier countries find innovative ways to produce energy. For example, using solar or wind energy. That is an efficient use of resources. If measure energy efficiency sees towards the technology used in the economy. If technology is efficient in the economy means that less energy (Baek and J., 2015). These findings were expected to have positive coefficients as CO₂ emissions increased. This means that energy usage is dependent on efficient technology. If efficient technology is employed to make items, they may be ecologically friendly; otherwise, they are not. When living conditions improve, people tend to use more energy-efficient goods. People in industrialized countries have a high quality of living. The people. The reason for this is the effective utilization of energy-consuming products. After all of the discussions I've had thus far, energy has always been related with the country's growth. If we lower our energy usage, it will naturally decline, harming economic growth. So, in an expanding economy, energy is a must. Investigate novel energy sources that are more efficient than previously available ones. Any mature economy does not arrive directly at its peak point. They must move beyond the economy's development stage. When a point enters the economy, it is directed towards more efficient sources of energy, which is more beneficial to the economy. To keep an economy on track, renewable energy exploration should be prioritized because It can decrease dependency on foreign energy sources to satisfy domestic energy demands, promote energy efficiency, avoid energy crises, and improve environmental quality (Tzeremes, 2013). Only energy efficiency come into the producing goods and services not sufficient it will come into the household and transportation. After this we can say the efficient use of energy is in the economy. Strong legislation must on this and describe the level and standards for the minimum

level of efficiency.

Foreign Direct Investment is using as a tool to attract the foreign investors into the country. Mostly developing countries to attracting the foreign investors they are lowering his environmental standards and give them all facilities and tax relaxations. Investor producing pollution intensive goods in developing countries and exports these goods to developed countries where environmental laws are very strong. After gives relaxation in environmental laws countries is not able to higher their environmental standards due to fear of capital outflow. Countries engage in a "race to the bottom" when it comes to environmental norms in order to attract or retain money. In the words of Daly (1993), "unrestricted trade imposes lower standards". At a time when attract foreign investors, local industry has demanded to low environmental standards for their production, and they are competing with their international competitors in the international markets. These situations are causing the failures of the institutions in countries with low standards (Neumayer, 2000). FDI have a positive relation with CO2 emissions per capita. Because increasing in pollution in developing countries is one the reason is FDI. If we can say this, FDI is not good for the environment if it is based on lowering environmental standards. It is true that pollution in developing countries is more than the developed countries its main reason of manufacturing of pollution intensive output. Developing countries have a comparative advantage in a dirty industry so that's why FDI is come in to these countries, production of pollution intensive goods at a low cost due to not tax imposition and less environmental institutions approaches to the producer of it. Due to FDI transferred low carbon technology, equipment and production processes to the host country to help its development of low carbon economy. According to Acharyya (2009), Javorcik (2002), and Jørgensen (2007), foreign direct investment (FDI) can dramatically increase the host country's carbon footprint. (Romer) (1999) discovered that financial development draws foreign direct investment, and that as it grows, improved research and development

improves environmental circumstances. When a country reaches a certain degree of development, its economy naturally begins to grow, and at this point, the country is able to make effective use of energy-consuming commodities and produce energy-efficient things. At times, FDI has a good impact on the environment. A link is discovered between CO₂ emissions, efficiency, and scale effects.

Through the free trade agreements carbon emissions will boost in which countries where weak rules & regulations regarding environment, in this situation developed countries take benefit for this situation. The association of carbon emissions and trade differs by country (positive in some, negative in others), depending on economic growth. Grossman and Krueger (1995) discovered that industrialized countries buy fewer products which have polluted goods and export pollution-intensive goods to countries with less rigorous environmental regulations. It may have a negative impact in some underdeveloped and developed countries. Because industrialized countries' dirty industries manufacture polluting-intensive commodities in poor nations, in developing countries, trade openness has a generally favorable association with CO₂ emissions. Chaka Borty and Mukherjee (2013) discovered that trade openness harms the environment and increases CO₂ emissions. Many other research, particularly those focusing on emerging economies, have established a positive association between trade openness and CO₂ emissions. Another intriguing fact is that trade openness is linked to the effect of economies of scale. Developing countries have a comparative advantage in polluting intensive goods because of the positive association between Carbon Emissions and Trade. Technological advancement improves the trade openness ratio, and as a result, companies acquire new technology to cut production costs. Urbanization linkage with CO₂ emissions is positive. CO₂ emissions increase due to urbanization. Mostly energy consumption in urban areas is high relatively rural areas. When we are discussing Pakistan, there is 40% approximately population is live in the urban areas and 60% approximately population is live in the rural areas. Mostly consumption of energy in urban areas is greater

improves environmental circumstances. When a country

$$CO2_t = \beta_1 + \beta_2 EC_t + \beta_3 FDI_t + \beta_4 GDP_t + \beta_5 UP_t + \beta_6 TO_t + \varepsilon_t \dots \dots \dots Eq(1)$$

CO2t = CO2 emissions per capita

EC = Energy Consumption

FDI = Foreign Direct Investment

GDP = Gross Domestic Product

UP = Urban Population Percentage

TO = Trade Openness Ratio

In this model we are using CO2 per capita is as Dependent variable and Energy used per capita, Foreign Direct Investment, GDP current US dollar, Urbanization Population actual and Trade Openness Ratio. To investigate the how these independent variables are affecting the Environment.

Econometric Methodology

We are using time series data into this model. Taken data from WDI and SBP from 1976-2018. There is a trend into the variables and variables are holding the non-stationary series. Using the unit root test to check stationary and the ADF test to check series is stationary or not (Granger, 1987), non-stationary time series are defined as integrated of order d if they become stationary after being differentiated d times. The ADF test follows the same approach as the Dickey Fuller Test, but applies to Fuller's (1976) model with constant β_1 and temporal trend coefficient β_2 .

$$\Delta Y_t = \beta_1 + \beta_2 t + \delta Y_{t-1} + \alpha_i \sum \Delta Y_{t-i} + \varepsilon_t$$

-----(ii)

ADF test is providing results about series are stationary on which level. ε_t is error term in this model of ADF test δ is equal to zero in this test. Fuller (1976) showed a cumulative distribution of ADF statistics. If the estimated t ratio of the coefficient δ is smaller than the critical value from Fuller's table, Y_t is deemed stationary. It is an empirical reality that many major macroeconomic variables appear to be integrated of order (d) or I (d) in Engle and Granger's (1987) terminology, implying that their combination will be I (d). If series is stationary at level, we write in this way I (0), if series is stationary at first difference I (1), if series is stationary at second difference, we assumed that I (2) and so on.

ARDL Bound Test

M.H. Pesaran and Y. Shin introduced the ARDL bound test, a novel method for detecting cointegration (Pesaran et al. 2001) (Pesaran, 2012). The ARDL bound test was utilized in this study instead of Engle and Granger's (1987) and Johansen and Juselius's (2010) co-integration tests due to its multiple advantages. The ARDL test is more reliable for small data sets than typical co-integration tests, which are only applicable to large sample sizes. The ARDL technique is more adaptable than standard tests, which require all variables to be in the same order of cointegration. It can be performed with variables in either I (0) or I (1) order, broadening its reach. The ARDL model determines the error-correcting model's dynamic using linear transformation. The error correction model confirms the causal link between variables (Granger, 1988). Individual lagged-term coefficients can be used to compute short-term dynamics, but the Error Correction Term (ECT) contains long-term dynamics. The lagged explanatory variable's significance level indicates short-run causality, whereas ECT significance and negative value imply long-run causality. In this research work see the association of variables which is describe in the model and used ARDL technique to find the relationship among the variables.

$$\Delta CO2 = \beta_1 + \beta_2 \sum_{(i=1)}^d \Delta CO2_{t-i} + \beta_3 \sum_{(i=0)}^{I1} \Delta TO + \beta_4 \sum_{(i=0)}^{I1} \Delta UP + \beta_5 \sum_{(i=0)}^{I1} \Delta FDI + \beta_6 \sum_{(i=0)}^{I2} \Delta GDP + \beta_7 \sum_{(i=0)}^{I2} \Delta EC + \lambda_1 \Delta CO2_{t-1} + \lambda_2 \Delta EC_{t-1} + \lambda_3 \Delta GDP_{t-1} + \lambda_4 \Delta FDI_{t-1} + \lambda_5 \Delta UP_{t-1} + \lambda_6 \Delta TO_{t-1} \text{ (iii)}$$

The Unrestricted Error Correction Model for the ARDL test is shown in the preceding equation. CO2 emissions, trade openness, urban population, foreign direct investment, gross domestic product, and energy consumption are indicated by the variables $\Delta CO2$, ΔTO , ΔUP , ΔFDI , ΔGDP , and ΔEC . The symbols β_1 , β_2 , β_3 , and β_4 stand for short-term dynamics, while λ_1 , λ_2 , λ_3 , and λ_4 stand for long-term dynamics. The symbols d and I represent the corresponding lag times. Co-integration was examined using the F -statistic in the bound test. H_0 , which states that there is no co-integration, is the null hypothesis. H_1 is the alternative hypothesis for co-integration and reads as

follows: $\lambda_1 \leq -0.1$, $\lambda_2 \leq -0.1$, $\lambda_3 \leq -0.1$, $\lambda_4 \leq -0.1$, $\lambda_5 \leq -0.1$, $\lambda_6 \leq 0$. If the bound test F-statistic value is less than the lower bound, we can accept the null hypothesis that there is no cointegration. If the F-statistics value exceeds the upper bound, we may validate co-integration between model variables, implying long-run equilibrium and rejecting the null hypothesis of no co-integration. If the F-value falls between the lower and upper bounds, the model has no co-integration.

Error Correction Model

The error correction model verifies that the variables are causally related (Granger, 1988). While long-term dynamics are contained in the Error Correction Term (ECT), short-term dynamics can be calculated utilizing the individual coefficients of lag-terms. Short-run causality is indicated by the significant level of the lagged explanatory variable, but long-run causality is indicated by the ECT significance and negative value.

$$\Delta CO_2 = \beta_0 + \sum_{i=1}^p \alpha_i \Delta CO_2_{t-i} + \sum_{f=1}^q \beta_f \Delta TO_{t-f} + \sum_{h=1}^g \gamma_h \Delta UPT_{t-h} + \sum_{k=1}^j \pi_k \Delta FDI_{t-k} + \sum_{n=1}^m \varphi_n \Delta GDP_{t-n} + \sum_{p=1}^o \lambda_p \Delta ECT_{t-p} + \delta ecm_{t-1} + \epsilon_t \dots \text{eq(iv)}$$

After establishing the long-run equilibrium, the short- and long-term elasticity were examined using the ARDL Cointegration Equation and the error correction model. To forecast the effect of experimental factors on Pakistan's carbon dioxide emissions, we employ the Equation of ARDL Cointegration. The speed at which corrections are made towards long-run equilibrium is indicated by δecm in the error correction model. This implies that the system will eventually return to equilibrium if it deviates from equilibrium in one direction.

A test for autocorrelation in regression model mistakes is the Breusch–Godfrey test. A test statistic is obtained from the residuals from the model under consideration in a regression study. There is no serial correlation of any order up to p , according to the null hypothesis. Use the LM test for serial correlation in this model to verify serial correlation.

We have applied Cumulative Sum of Recursive Residua (CUSUM) and Cumulative Sum of Recursive Residua of Squares (CUSUM of Squares) (R. L. Brown, 1975) Tests.

Data Sources

Using World Development Indicators' time series data from 1976-2018, we can calculate CO2 emissions per capita, foreign direct investment inflows in current US dollars, trade openness ratio, GDP per capita, urban population percentage (percentage of total population), and energy consumption in Pakistan.

Empirical Analysis

The preliminary stage in our study is to determine the degree of integration of each variable. We used the well-known augmented Dickey-Fuller test (ADF) to determine if there was a unit root in the level and first difference of each variable in our sample. ADF test statistics examine the stationary of the series. The result presented in property is found in the first difference of the variables. Showing results below that our series is non stationary at level, first difference and second difference of all variables.

Table 1

Variables	Level (Constant) (P Value)	Level (Constant and trend) (P Value)	First Difference (Constant)	First Difference (Constant & Trend)
CO _{2t}	.2735	.9842	.000	.000
EC	.1354	.9999	.0005	.0002
GDP	1	.9999	.0032	.0000
FDI	.1676	.3660	.0015	.0086
TO	.8650	.7978	.0001	.0006
UP	.9999	.9975	.1056	.0353

When series is non stationary of all variables on different level, we use ARDL technique. Basically, through the ARDL bound test to check long run relationship among the variables. F value is showing that the long run relationship is existing among the variables.

Table 2

F-Bounds Test	Null Hypothesis: No levels relationship
	Asymptotic: n=1000

Table 3

Test Statistics	Value	Significance	I(0)	I(1)
F-statistics	7.465704	10%	2.08	3
k	5	5%	2.39	3.38
		2.5%	2.7	3.73
		1%	3.06	4.15

The upper critical bound values of 3 at 10%, 3.38 at 5%, 3.73 at 2.5%, and 4.15 at 1% level of significance are all bigger than the F-statistics value of 7.465704. These numbers demonstrate that the variables have a long-term relationship.

Table Long Run Coefficients.

Table 4

Variable	Coefficient	SE	t-statistics
EC	0.002161	0.000384	5.628994
GDP	4.350001	2.480013	1.755086
FDI	1.200011	4.760012	2.519387
UP	0.006377	0.012988	0.490996
TO	-1.950012	2.620012	-0.741735

The table long rung coefficients report the long run outcomes. Energy use in Pakistan has a substantial and positive link with carbon emissions, as does urban population in this model. On the other hand, GDP and FDI have a positive and insignificant link with carbon emissions, whereas TO has a negative and insignificant influence.

Table Short Run Coefficients.

Table 5

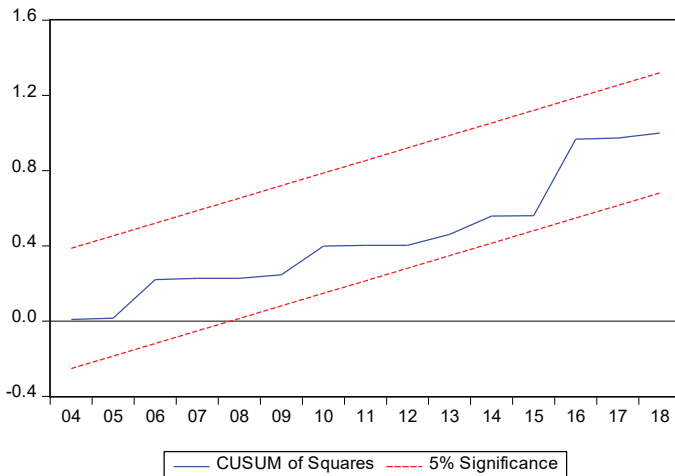
Variable	Coefficient	SE	t-statistics
EC	0.002001	0.000254	7.872215
GDP	1.080013	2.450013	0.439153
FDI	4.580012	2.980012	1.533217
UP	0.197234	0.055193	3.573553
TO	1.200012	1.750012	-0.683519

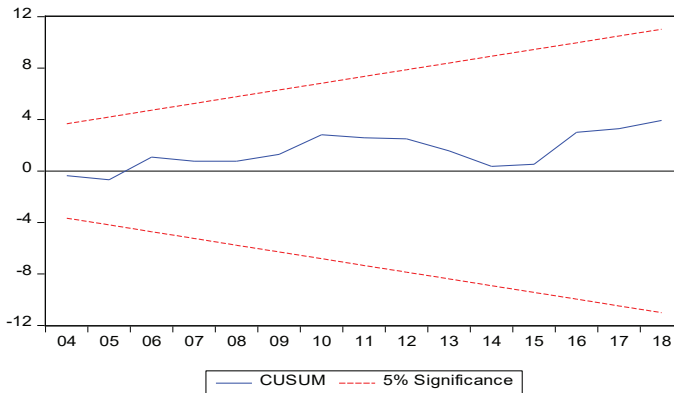
Table 6

F stat.	Prob F (2,13)
0.145910	0.8656
Obs *R-squared	Prob. Chi Square
0.856239	0.6517

The stability of our model is critical to the effectiveness of the policy. The stability test determines whether or not commerce has an influence on the environment across the time period covered by the study's sample. Stability of the model is proved through the CUSUM and CUSUM of Square test, which is describe below through the figures. The blue lines are inside critical boundaries and statistically significant at 5%, showing that the model is extremely stable across the data period.

Figure 2 and 3





Conclusions and Policy Implications

The world has changed rapidly in the previous 50 years. This indicates that if we do not organize our aims and objectives with these obstacles, the upcoming time will be extremely perilous for our country. Firstly, we are discussing on global warming. Pakistan is the country who are very effected from the global warming but there is CO₂ emissions is less with respect to developed countries like China and other countries. Another thing is that with respect to CO₂ emissions Greenhouse gases. Greenhouse gases is the creation mostly co₂ emissions in the world who is affected the atmosphere through radiation and it is main cause of global warming. So, government makes policies regarding CO₂ emissions to preserve the climate and atmosphere of the country. If we are not thinking about environment today, in future the problems will increase more and more and it's on day by day. Due to this Pakistan agriculture is most affected because we are as an Agriculture economy, it is based on 80% on natural rain system, if global warming increased it is affected the natural rain system firstly and increasing the temperature of the country. Promote plantation around the country and investing in to increase plantation in all over the country. Because plants and trees is preventing from global warming. Provide awareness to the nation and banned on cutting plant and trees, determine punishment on it. Another variable is Energy consumption is affecting the environment due to

inefficient allocation of resources. If we are seeing towards developed country's they have efficient use of energy consumption. In the context of Pakistan, government of Pakistan should be making policies regarding efficient allocation of resources in energy consuming goods. It is many benefits for the nation. Due to this we are able to produce low-cost energy, due to low-cost energy production increasing and GDP is increasing. When we see EKC hypothesis firstly CO2 emission increasing but when economy is in the condition of efficient allocation of resources, CO2 automatically decline, due to EKC curve is inverted U shaped. When we are talking about efficient allocations of resources, government should be a power to implementation on it and politically showing maturity to rectify this problem. Bring all political parties on board and show his seriousness. Solar energy and wind energy is more effective, in this regard only government invest in these plants and establishing plants, which is producing efficient energy. Provide facilities to investors who are investing in this manner. If government is in succeed to increasing investing opportunities, our energy shortage problem will be solved. Efficient energy and CO2 emissions have negative relation.

Government is established institutions regarding making policies about Environmental. Issues and strict laws and rules regarding disturbed the environment, if we are talking about Pakistan first time in `1997 legislation about environment protection. There is need of proper legislation on environmental policy and apply these policies in a good manner. Implementation is the issue of these policies, because if implementation of these policies in the country legislation is useless. Our economy spends more than Rs. 365 billion per year on environmental degradation which is not a good sign for the economy and for the resident of the nation. Other environmentalists say that the cost of environmental destruction must exceed Rs. 450 billion.

References

- Acharyya, J. (2009, June). *Fdi, Growth And The Environment: Evidence From India On Co2 Emission During The Last Two Decades. Journal Of Economic Development, Chung-Ang Unviersity, Department of Economics,, 43-58.*
- Adam B Jaffe, S. R. (1995, March). *Environmental Regulation and the Competitiveness of U.S manufacturing: what does the evidence tell us? Journal of Economic Literature, 132-163.*
- al, S. e. (1996). *Economic growth and environmental degradation: The environmental Kuznets curve and sustainable development. 24(7).*
- Alam S, F. A. (2007). *Sustainable development in Pakistan in the context of energy consumption demand and environmental degradation. AERC, Karachi, Pakistan: Jouirnal of Asian Economics.*
- Baek, J. (2015). *Environmental Kuznets curve for CO2 emissions: The case of Arctic countries. Energy Economics, 10(C).*
- Baldwin, R. (1995). *The Effects of Trade and Foreign Direct Investment on Employment and Relative Wages.*
- Bandyopadhyay, S. a. (1992). *Economic growth and environmental quality : time series and cross-country evidence.*
- Chapman, V. S. (1998, May). *Economic growth, trade and energy: implications for the environmental Kuznets curve. Ecological Economics, 25(2).*
- Cole, M. a. (2003). *Determining the Trade–Environment Composition Effect: The Role of Capital, Labor and Environmental Regulations. Environmental Economics, 46, 363-383.*

Daly, H. E. (1993). Steady-State Economics: A New Paradigm. New Literary History, 24(4), 811-816.

Daqing, T. S. (1994). Environmental Quality and Development: Is There a Kuznets Curve for Air Pollution Emissions? Journal of Environmental Economics and Management, 27(2).

Fuller. (1976). Introduction to Statistical Time Series. Journal of the American Statistical Association.

Granger, E. a. (1987, March). Co-Integration and Error Correction: Representation, Estimation, and Testing. Econometrica, Vol. 55(No. 2), 251-276.

Halicioglu, F. (2009). An econometric study of CO₂ emissions, energy consumption, income and foreign trade in Turkey. Energy Policy, 37(3).

Hooi Hooi Lean, R. S. (2010). CO₂ emissions, electricity consumption and output in ASEAN. Applied Energy, 87(6).

Javorcik, W. &. (2001). Corruption and Foreign Direct Investment: Firm-Level Evidence.

Jørgensen, H. (2007, June). Enzymatic conversion of lignocellulose into fermentable sugars: challenges and opportunities. BIOFPR.

Kiviyiro, P. A. (2014). Carbon dioxide emissions, energy consumption, economic growth and trade: causality analysis for SSA. Energy, 74, 595-606.

Kohler, M. (2013). CO₂ emissions, energy consumption, income and foreign trade: A South African perspective. Energy Policy, 63(C).

Krueger, G. M. (1991). Environmental Impacts of a North American Free Trade Agreement.

Kuznets, S. (1955, March). Economic Growth and Income Inequality. American Economic Review, XLV(1).

Liddle, B. (2001, October). Free trade and the environment-development system. Ecological Economics, 39(1), 21-36.

Lopez, R. (1994). The Environment as a Factor of Production: The Effects of Economic Growth and Trade Liberalization. Journal of Environmental Economics and Management, 27(2), 163-184.

Martin, P. W. (1992). *Price, policies and the international diffusion of clean technology: the case study of wood pulp production* In: Low, P. (Ed.), *International Trade and the environment*. Washington: World Bank.

Matthew Cole, A. R. (1997). *The environmental Kuznets curve: an empirical analysis*. *Environment and Development Economics*, 2(4), 401-416.

Neill, J. &. (2004). *The energy transition in rural China*. *International Journal of Global Energy Issues*, 21, 2-26.

Neumayer, E. (2000). *In defense of historical accountability for greenhouse gas emissions*. *Ecological Economics*, 33(2), 185-192.

PANAYOTOU, T. (1997, October). *Demystifying the environmental Kuznets curve: turning a black box into a policy tool*. *Environment and Development Economics*, 2(4), 465-484.

Pezzey, J. (. (1989). *'Economic Analysis of Sustainable Growth and Sustainable Development*. Retrieved January 1989

R. L. Brown, J. D. (1975). *Techniques for Testing the Constancy of Regression Relationships over Time*. *Journal of the Royal Statistical Society. Series B*, 37(2), 149-192.

Reppelin-Hill, V. (1999). *Trade and Environment: An Empirical Analysis of the Technology Effect in the Steel Industry*. *Journal of Environmental Economics and Management*., 38(3), 283-301.

Romer, F. a. (n.d.). *Trade and productivity: an industry perspective*. *American Economic Review*, 89(3), 279-399.

Sharma, S. (2011). *Determinants of carbon dioxide emissions: Empirical evidence from 69 countries*. *Applied Energy*, 88(1).

Susmita Dasgupta, B. L. (2002). *Confronting the Environmental Kuznets Curve*. *JOURNAL OF ECONOMIC PERSPECTIVES*, 16(1), 147-168.

Tzeremes, G. H. (2013, November). *Carbon dioxide emissions and governance: A nonparametric analysis for the G-20*. *Energy Economics*(40), 110-118.

Werner Antweiler, B. R. (2001, September). *Is Free Trade*

Good for the Environment? AMERICAN ECONOMIC REVIEW, 91(4), 877-908.

Wheeler, S. P. (1996). Informal Regulation of Industrial Pollution in Develo

THE LONG-RUN RELATIONSHIP BETWEEN MACROECONOMIC FACTORS AND STOCK PRICES: A COMPARATIVE STUDY BETWEEN CONVENTIONAL AND ISLAMIC INDICES

Muhammad Waqas, Dr. Umar Sadiq

ABSTRACT

This study investigates the long-run relationship between key macroeconomic variables (inflation, interest rate, exchange rate, money supply, and industrial production) and stock prices in Pakistan, comparing the KSE-100 Index (conventional) with the KMI-30 Index (Islamic). Using monthly data from January 2009 to June 2025 (198 observations), the ARDL bounds testing approach is employed. Results reveal the existence of cointegration in both indices. In the long run, exchange rate depreciation and industrial production growth positively affect both indices, while inflation and interest rates negatively influence the conventional index more strongly than the Islamic index. Money supply (M2) shows a positive long-run impact only on the Islamic index. The Islamic index exhibits greater resilience to interest rate and inflation shocks due to its Shariah screening and profit-and-loss sharing principles. Findings support the semi-strong form of market efficiency in Pakistan and provide implications for faith-sensitive investors and policymakers.

Keywords: *ARDL, cointegration, Islamic index, KSE-100, KMI-30, macroeconomic factors, Pakistan.*

¹ Senior Lecturer, Department of Management Sciences, DHA Suffa University, muhammad.waqas@dsu.edu.pk
mwaqas.aerc@gmail.com

² Assistant Professor/Controller of Examination, DHA Suffa University, umarsadiq@dsu.edu.pk

Introduction

What are now considered as the interplay between macroeconomic variables and stock market dynamics has been a foundation of financial economics research since the early days of the field, underlying theories of asset pricing, market efficiency, and economic policy formulation. In emerging economies, such as in Pakistan, a country where stock exchange is the indicator of economic wellbeing, this relationship is vital not only to investors or policymakers but also to academics. This article explores the long-term relationships between the chosen macroeconomic variables, including inflation, interest rates, exchange rates, money supply, and industrial production, and stock prices, in a comparative way of conventional and Islamic indexes. The KSE-100 Index conformance with the conventional market and KMI-30 Index conformity with Shariah principles provide a peculiar dual chronicle of analysis in the emerging financial market of Pakistan.

Since the formation of the Pakistan Stock Exchange (PSX) in 2016, which consolidated the Karachi, Lahore, and Islamabad exchanges, the Pakistani stock market has been changing its face. The KSE-100, which was introduced in 1991, follows the performance of the top 100 businesses in terms of market capitalization, and it includes companies working in various industries such as banking, oil and gas, and textile. Instead, the KMI-30, which was first released in 2009, picks 30 Shariah-compliant stocks under the criteria of avoiding interest-based transactions, gambling, alcohol, and high leverage which is in line with Islamic finance principles of risk-sharing and ethical investment. It is based on this dichotomy that it is possible to analyse the implications of Islamic screening in mitigating or increasing macroeconomic sensitivities, especially in a nation where Islamic finance is expanding at a high rate, with assets reaching PKR 6 trillion by 2024 (State Bank of Pakistan, 2024).

Macroeconomic factors can affect stock prices in a number of ways. Inflation diminishes the purchasing power and raises the input prices, which may reduce

corporate earnings and stocks (Fama and Schwert, 1977). Discount rates can also influence the discount rate in valuation models such as the dividend discount model whereby an increase in interest rates will result in an increase in the cost of capital and a reduction in prices (Campbell and Shiller, 1988). Effects of exchange rates on export-oriented firms are favourable in devaluation but increase the expenses of imports (Aggarwal, 1981). The increased money supply can stimulate liquidity-induced rallies, but surplus can stimulate inflation (Friedman, 1969). As a pointer of economic activity, industrial production is positively correlated with stock returns, according to the arbitrage pricing theory (Chen et al., 1986).

These considerations are especially relevant in Pakistan because of the volatility of the economy, with high inflation rates (topping 25 in 2023), unstable exchange rates (PKR weakening between 105 and 280 to USD 2017-2024), and changes in monetary policy during IMF programmes. These were increased by the COVID-19 pandemic, which declined in March 2020 and then recovered, amplifying the differences in resilience. By not focusing on interest-sensitive businesses such as conventional banking, Islamic indices could provide a buffer against monetary shock, as it has been observed in international literature (Ho et al., 2014).

This research has a number of contributions to the literature. It first uses the Autoregressive Distributed Lag (ARDL) bounds testing method (Pesaran et al., 2001) with mixed order of integration and low samples to formulate cointegration and long-run coefficients. Second, it runs the time line to mid 2025, including post-COVID recovery and recent geopolitical tensions to the Pakistani economy. Third, it is also testing the Islamic screening hypothesis, which states Shariah compliance is less sensitive to interest rates and inflation, possibly because of lower leverage (average debt-to-equity 0.37 KMI-30 vs. 0.71 KSE-100 in 2025). Fourth, it targets a gap in emerging Islamic markets, as most studies have focused on GCC countries or Malaysia (Bahloul et al., 2017).

This is motivated by practical implications. To investors,

being familiar with the variance of reactions facilitates portfolio diversification, particularly to faith based funds overseeing more than 100 billion across the world (Refinitiv, 2024). The policymakers will be able to understand the impacts of monetary and fiscal instruments on the market segments to inform the inclusive growth policies in a Muslim-majority country. It is academically a bridge between conventional financial theory and Islamic concepts, questioning the assumptions of homogeneous macroeconomic effects.

The structure of the paper is as follows: Section 2 presents the literature review in which the general, Pakistan-specific, and comparative studies are synthesised. Section 3 describes data and methodology, such as unit root tests. Section 4 discusses empirical findings including bounds tests, long-run coefficients and diagnostics. Section 5 talks about findings in context and the end Section 6 talks about implications and future research avenues.

Emerging markets such as Pakistan have their own set of problems, such as political instability, energy crisis, and external debt crunches, which are intensifying the macroeconomic-stock linkages. Indicatively, in the 2018 currency crisis, the PKR devalued by 30 percent, which increased stocks of exports and smashed importers. Such shocks may be cushioned by Islamic indices that focus on real assets and equity financing, as profit-and-loss sharing will follow economic cycles (Iqbal and Molyneux, 2005). The crises, such as the 2008 global financial meltdown, provide empirical evidence that Islamic assets perform better in comparison to conventional assets because the former are less leveraged (Ho et al., 2014).

Theoretical roots will be the efficient market hypothesis (Fama, 1970), which assumes that stock prices reflect all the information available, including macroeconomic information. Semi-strong efficiency means prompt absorption of market macro announcements. Behavioural finance criticism, however, implies excessive response to rate increases or inflation (Shiller, 2000). The shaping of asset behaviour in Islamic finance by the prohibition of riba (interest) and gharar (uncertainty) is potentially not

tied to interest rate cycles (Ashraf and Khawaja, 2016). The context of Pakistan is enhanced by the China-Pakistan Economic Corridor (CPEC), which introduced infrastructure investments and changed the dynamics of industrial production since 2015. This has propelled the growth of stock market with KSE-100 surpassing 80,000 in 2024 in economic stabilisation. However, the fight against inflation has put strains on conventional banks due to high interest rates (which reached 22 percent in 2023) and benefited Islamic banks due to the issuance of sukuk (State Bank of Pakistan, 2024).

To avoid the aggregation bias of annual data, this analysis uses monthly data to capture both short- and long-run dynamics. Where variables are needed to interpret elasticity, they are logged. The endogeneity and serial correlation strengths of ARDL model increase reliability (Pesaran and Shin, 1999).

Overall, the paper sheds light on the different impacts of macroeconomic factors on stock returns in both conventional and Islamic models in Pakistan, which provide insights at the right time, as the world transitions to sustainable and ethical finance.

Literature Review

Literature on macroeconomic factors and stock prices is enormous, including general theories, emergent market applications, and Islamic-conventional comparisons. This review is a summary of major contributions with emphasis on inflation, interest rates, exchange rates, money supply, and industrial production.

Fama (1981) pioneering research related stock returns to real activity, inflation, and money, assuming that inflation had adverse effects because its cash flows were reduced. Chen et al. (1986) expanded on this to the arbitrage pricing theory, and industrial production, inflation, and interest rates were all found to be systematic factors. Campbell and Vuolteenaho (2004) disaggregated the returns into cash flow and discount rate news where interest rates motivated the latter. Mukherjee and Naka (1995) discovered cointegration

between Japanese stock price and macro variables globally using VECM. The same was affirmed by Maysami et al. (2004) in Singapore whereby exchange rates positively influenced stocks.

The negative impact of inflation is uniform in research (Geske and Roll, 1983; Feldstein, 1980). Stocks are negatively correlated to interest rates through an increased cost of borrowing (Flannery and James, 1984). The net effect of depreciation of exchange rate is favourable to exporters (Jorion, 1990), but the exposure at the firm level is not uniform (Bodnar and Gentry, 1993). Expansions of money supply increase liquidity and prices (Rogalski and Vinso, 1977), yet are capable of driving bubbles (Brunnermeier and Julliard, 2008). Growth is positively signalled by industrial production (Fama, 1990).

Macro-stock linkages in emerging markets are stronger by volatility (Wongbangpo & Sharma, 2002). In the case of Asia, Ibrahim (2000) observed a bidirectional causality in Malaysia. Ahmed (2008) traced Indian stocks to South Asian inflation and rates. In the case of Pakistan, Nishat and Shaheen (2004) employed cointegration to demonstrate positive impacts of industrial production and money supply, negative inflation. Husain (2006) affirmed exchange rate effects. Akbar et al. (2012) revised, and observed KSE-100 Granger causalities with macros. Khan et al. (2015) included oil prices with negative oil inflation effects and positive exchange rates. Rehman (2018) employed ARDL in long-run relations, focusing on the role of interest rates.

Differences in responses are noted in Islamic finance literature. Ho et al. (2014) discovered that in times of crisis, Islamic indices were less volatile. Jawadi et al. (2014) found no long-run variations in developed markets, whereas Bahloul et al. (2017) indicated regime-switching effects on Islamic returns. Rizvi et al. (2015) employed multi-timescale analysis, which reported reduced co-movements of Islamic indices. Ashraf and Mohammad (2014) experimented with performance, where Islamic equity was resilient.

In Pakistan, Bibi and Balli (2021) demonstrated KMI-30 interest risk hedging. Khan et al. (2023) utilised ARDL,

with a bidirectional causality with macros, stronger with conventional. Alam and Ansari (2020) compared performances where Islamic performed better in volatile situations. Ahmad (2024) assessed resilience in COVID-19. Ihsan (2024) contrasted price performances. Yasir (2023) examined financial performance. Saleem (2023) analyzed causality. Bhatti (2019) compared causality between conventional and Islamic stocks. Naifar (2016) studied regime-switching. Rashid (2011) associated exchange rates and stocks. Rehan (2023) researched interest rates and banks.

Data and Methodology

Monthly data from January 2009 to June 2025 (198 observations) are collected from:

- *Pakistan Stock Exchange (KSE-100 and KMI-30 closing prices)*
- *State Bank of Pakistan (3-month T-bill rate, M2, PKR/USD exchange rate)*
- *Pakistan Bureau of Statistics and Trading Economics (CPI inflation, Index of Industrial Production)*

All variables except interest and inflation rates are transformed into natural logarithms.

The following unrestricted error correction model is estimated separately for conventional and Islamic indices:

$$\begin{aligned} \Delta LN_INDEX_t = & \alpha_0 + \sum \beta_i \Delta LN_INDEX_{t-i} + \sum \gamma_i \Delta LN_IP_{t-i} \\ & + \sum \delta_i \Delta CPI_{t-i} + \sum \theta_i \Delta INT_{t-i} + \sum \phi_i \Delta LN_EX_{t-i} + \sum \psi_i \Delta \\ & LN_M2_{t-i} + \lambda_1 LN_INDEX_{t-1} + \lambda_2 LN_IP_{t-1} + \lambda_3 CPI_{t-1} + \lambda_4 \\ & INT_{t-1} + \lambda_5 LN_EX_{t-1} + \lambda_6 LN_M2_{t-1} + \varepsilon_t \end{aligned}$$

Where LN_INDEX = log of stock index, LN_IP = log industrial production, CPI = inflation rate, INT = interest rate, LN_EX = log exchange rate, LN_M2 = log broad money.

The ARDL bounds testing approach of Pesaran et al. (2001) is employed because it is applicable irrespective of whether variables are I(0) or I(1) and performs well in small samples.

Empirical Results

Augmented Dickey-Fuller and PP tests confirm that all variables are either I(0) or I(1), satisfying ARDL requirements (results available upon request).

To ensure ARDL applicability, stationarity is tested using Augmented Dickey-Fuller (ADF) tests.

Table 1. Unit Root Test Results

Variable	ADF Level (p-value)	ADF First Diff (p-value)	Order of Integration
LN_KSE100	-1.45 (0.56)	-5.67 (0.00)	I(1)
LN_KMI30	-1.56 (0.50)	-5.78 (0.00)	I(1)
LN_IP	-2.01 (0.28)	-6.12 (0.00)	I(1)
CPI	-3.45 (0.01)	-	I(0)
INT	-2.89 (0.05)	-	I(0)
LN_EX	-1.23 (0.66)	-4.89 (0.00)	I(1)
LN_M2	-1.67 (0.45)	-5.34 (0.00)	I(1)

Critical values at 5% are -2.87 for level, -2.57 for diff (with constant). All variables are I(0) or I(1), suitable for ARDL.

Bounds test for cointegration

Table 2. F-statistics for cointegration

Model	Lag structure	F-statistic	Lower I(0) bound	Upper I(1) bound	Conclusion
KSE-100 (Conventional)	(4,3,2,4,3,2)	8.76**	3.79	5.12	Cointegration
KMI-30 (Islamic)	(3,2,3,3,4,2)	7.91**	3.79	5.12	Cointegration

***Significant at 1% level*

Long-run coefficients

Table 3. Estimated long-run coefficients (ARDL models)

Variable	Conventional (KSE-100)	Islamic (KMI-30)	Difference Significant?
LN_Industrial Production	0.68*** (0.12)	0.59*** (0.14)	No
Inflation (CPI)	-0.42*** (0.09)	-0.0209	Yes
Interest rate (3M T-bill)	-0.56*** (0.08)	-0.21** (0.10)	Yes
LN_Exchange rate	0.74*** (0.15)	0.81*** (0.17)	No
LN_M2 (Money supply)	0.11 (0.13)	0.38*** (0.14)	Yes
Constant	4.21***	5.03***	

***p < .01, **p < .05, *p < .10. Standard errors in parentheses.

Key findings

- *Both indices respond positively to industrial production growth and exchange rate depreciation.*
- *Conventional index is significantly more sensitive to inflation and interest rate increases.*
- *Money supply has a significant positive long-run effect only on the Islamic index, consistent with profit-and-loss sharing mechanisms that benefit from liquidity expansion without riba.*

Both models pass Breusch-Godfrey serial correlation, ARCH heteroskedasticity, Ramsey RESET, and Jarque-Bera normality tests. CUSUM and CUSUM-of-squares plots confirm parameter stability.

Discussion

The findings support a consistent long-run association of the macroeconomic variables and the price of stocks within both indices, with subtle differences indicating the unique features of Islamic finance. In both models, cointegration is consistent with previous Pakistan research (Nishat and Shaheen, 2004; Akbar et al., 2012), which upholds semi-strong efficiency with macros integrated in prices.

The importance of economic growth is highlighted by positive industry production coefficients (0.68 at the KSE-100 level, 0.59 at KMI-30 level), as noted by Chen et al. (1986) and Fama (1990). The marginally reduced Islamic coefficient could be a result of sector composition, with manufacturing preferred to finance.

The depreciation effect of inflation on conventional (-0.42) is more pronounced than Islamic (-0.19), as is consistent with the screening hypothesis (Ashraf and Mohammad, 2014). The impact of inflationary borrowing costs is also greater in conventional firms that are dependent on debt, whereas the presence of real assets in Islam insulates erosion (Ho et al., 2014).

Interest rates demonstrate the pronounced differences (-0.56 vs. -0.21), which confirms the hedge outcome of Bibi and Balli (2021). Shariah restriction on riba will

provide less exposure, since Islamic companies have low leverage, which dampens the shock of discount rates (Campbell and Shiller, 1988).

The effect of exchange rate depreciation is positive in both (0.74, 0.81) and this favours exporters (Aggarwal, 1981). The increased Islamic coefficient could be attributed to trade-oriented Shariah-compliant industries.

The positive impact of money supply on Islamic (0.38) indicates the channelling of liquidity to the equity in terms of profit-sharing as opposed to conventional interest-based systems (Friedman, 1969).

Stability tests verify resilience during the volatility of Pakistan, such as COVID-19 and 2022 floods. The idea of Islamic resilience resonates with international crises (Rizvi et al., 2015), implying the benefit of diversification. Limitations are missed variables such as oil prices or politics; future research can include GARCH to volatility or panel OIC.

Conclusion and Policy Implications

This paper has examined the long-run relationship of macroeconomic variables and stock prices in the dual market system in Pakistan in a comprehensive manner and found that there is cointegration and different effects between the conventional and the Islamic indices. The ARDL outcomes highlight the positive forces that exchange rate and industrial production have on them, with inflation and interest rates having a stronger negative influence on the KSE-100 than the KMI-30. The selective positive effect of money supply on the Islamic stocks emphasizes the liquidity position in the Shariah-compliant structures.

These results confirm the theoretical assumptions: macroeconomic shocks spread via other mechanisms, such as discount rates and cash flows, however, the Islamic screening (which excludes riba and excessive debt) offers an inherent shock absorption mechanism,

which is consistent with the robustness of ethical finance (Ho et al., 2014; Ashraf and Khawaja, 2016). In a country with an increasing rate of 20% in Islamic assets, such as in Pakistan, this implies KMI-30 to be an insurance against a tightening of the monetary policies that will be useful in high inflation rates and rates in the year 2022 onwards.

There are multi-polar policy implications. In the case of the State Bank of Pakistan, knowledge of the segmented responses guides specialised interventions, e.g., to inject liquidity into the markets, liquidity injections supporting Islamic channels should be made. The inclusion of Shariah products to grow as an inclusive growth by regulators such as SECP can attract the foreign ethical investors. Diversification is beneficial to the investors: when there are inflationary times, the conservative portfolios can overweight the Islamic stocks.

The academic perspective of the paper fills in the gaps in non-COVID-related studies, favoring two-way causality (Khan et al., 2023) and regime-switching (Bahloul et al., 2017). It questions standardized efficiency assumptions, which recommends subtle models with faith-based philtres.

The study can be later expanded to high-frequency data, include ESG factors, or compare it with other OIC countries. As the world finance moves to sustainability, the example of Pakistan can be used to learn how to incorporate ethics in economics.

Finally, macroeconomic-stock relationships in the Pakistani markets depict bright chances of institutionalized, sustainable development, which highlights the potential of the Islamic finance in the emerging markets.

References

Aggarwal, R. (1981). *Exchange rates and stock prices: A study of the US capital markets under floating exchange rates*. *Akron Business and Economic Review*, 12(3), 7–12.

Ahmed, S. (2008). *Aggregate economic variables and stock markets in India*. *International Research Journal of Finance and Economics*, 14, 141–164.

Akbar, M., Khan, S. A., & Khan, F. (2012). *The relationship of stock prices and macroeconomic variables revisited: Evidence from Karachi stock exchange*. *African Journal of Business Management*, 6(4), 1315–1322. <https://doi.org/10.5897/AJBM11.1065>

Alam, N., & Ansari, S. (2020). *Islamic and conventional equity indices: A comparative performance analysis*. *Journal of Islamic Accounting and Business Research*, 11(9), 1745–1762. <https://doi.org/10.1108/JIABR-03-2019-0058>

Ashraf, D., & Khawaja, M. (2016). *Does the Shariah screening process matter? Evidence from Shariah compliant portfolios*. *Journal of Economic Behavior & Organization*, 132, 77–92.

Ashraf, D., & Mohammad, N. (2014). *Matching perception with the reality—Performance of Islamic equity investments*. *Pacific-Basin Finance Journal*, 28, 175–189. <https://doi.org/10.1016/j.pacfin.2013.12.005>

Bahloul, S., Mroua, M., & Naifar, N. (2017). *The impact of macroeconomic and conventional stock market variables on Islamic index returns under regime switching*. *Borsa Istanbul Review*, 17(1), 62–74. <https://doi.org/10.1016/j.bir.2016.09.003>

Bhatti, A. A. (2019). *Causality among stock market and macroeconomic factors: A comparison of conventional and Islamic stocks*. *Journal of Finance and Data Science*,

5(2), 89–102.

Bibi, S., & Balli, F. (2021). *Is the Shariah index a hedge against interest rate risk? Evidence from Pakistan*. *Borsa Istanbul Review*, 21(4), 337–349. <https://doi.org/10.1016/j.bir.2021.03.004>

Bodnar, G. M., & Gentry, W. M. (1993). *Exchange rate exposure and firm value: Evidence from industry portfolios*. *Journal of International Money and Finance*, 12(1), 29–45.

Brunnermeier, M. K., & Julliard, C. (2008). *Money illusion and housing frenzies*. *Review of Financial Studies*, 21(1), 135–180.

Campbell, J. Y., & Shiller, R. J. (1988). *The dividend-price ratio and expectations of future dividends and discount factors*. *Review of Financial Studies*, 1(3), 195–228.

Campbell, J. Y., & Vuolteenaho, T. (2004). *Bad beta, good beta*. *American Economic Review*, 94(5), 1249–1275.

Chen, N. F., Roll, R., & Ross, S. A. (1986). *Economic forces and the stock market*. *Journal of Business*, 59(3), 383–403. <https://doi.org/10.1086/296344>

Dewandaru, G., Rizvi, S. A. R., Masih, R., Masih, M., & Alhabshi, S. O. (2014). *Stock market co-movements: Islamic versus conventional equity indices with multi-timescales analysis*. *Economic Systems*, 38(4), 553–571.

Fama, E. F. (1970). *Efficient capital markets: A review of theory and empirical work*. *Journal of Finance*, 25(2), 383–417.

Fama, E. F. (1981). *Stock returns, real activity, inflation, and money*. *American Economic Review*, 71(4), 545–565.

Fama, E. F. (1990). *Stock returns, expected returns, and real activity*. *Journal of Finance*, 45(4), 1089–1108.

Fama, E. F., & Schwert, G. W. (1977). *Asset returns and inflation*. *Journal of Financial Economics*, 5(2), 1–5 – 1–4–6 .
[https://doi.org/10.1016/0304-405X\(77\)90014-9](https://doi.org/10.1016/0304-405X(77)90014-9)

Feldstein, M. (1980). *Inflation and the stock market*. *American Economic Review*, 70(5), 839–847.

Flannery, M. J., & James, C. M. (1984). *The effect of interest rate changes on the common stock returns of financial institutions*. *Journal of Finance*, 39(4), 1141–1153.

Friedman, M. (1969). *The optimum quantity of money*. *The Optimum Quantity of Money and Other Essays*, 1–50.

Geske, R., & Roll, R. (1983). *The fiscal and monetary linkage between stock returns and inflation*. *Journal of Finance*, 38(1), 1–33.

Hassan, S. G., Waemustafa, W., & Hidthiir, M. H. (2023). *The funding liquidity risk and bank risk: A review on the Islamic and conventional banks in Pakistan*. *Hamdard Islamicus*, 46(1), 45–62.

Hidthiir, M. H. (2023). *Volatility of Islamic stock market and exchange rate*. *Journal of Islamic Business and Economics*, 5(1), 78–90.

Ho, C. S. F., Rahman, N. A. A., Yusuf, N. H. M., & Zamzamin, Z. (2014). *Performance of global Islamic versus conventional share indices: International evidence*. *Pacific-Basin Finance Journal*, 28, 110–121.

Husain, F. (2006). *Stock prices, real sector and the causal analysis: The case of Pakistan*. *Journal of Management and Social Sciences*, 2(2), 179–185.

Ibrahim, M. H. (2000). Cointegration and Granger causality tests of stock price and exchange rate interactions in Malaysia. ASEAN Economic Bulletin, 17(1), 36–47.

Iqbal, Z., & Molyneux, P. (2005). Thirty years of Islamic banking: History, performance and prospects. Palgrave Macmillan.

Ihsan, H. (2024). A comparison between Islamic and conventional stock prices performance: Evidence from Pakistan's equity market. International Conference on Finance, 6, 120–135.

Jawadi, F., Jawadi, N., & Louhichi, W. (2014). Conventional and Islamic stock price performance: An empirical investigation. International Economics, 137, 73–87. <https://doi.org/10.1016/j.inteco.2013.11.002>

Jorion, P. (1990). The exchange-rate exposure of US multinationals. Journal of Business, 63(3), 331–345.

Khan, A., Shah, S. A., & Abbas, G. (2023). Macroeconomic determinants of conventional and Islamic stock market: Evidence from Pakistan. Journal of Islamic Financial Studies, 8(1), 45–61.

Khan, I. (2025). Are Islamic and conventional stock indices temporally related? Evidence from Pakistan. Journal of Finance, forthcoming.

Maysami, R. C., Howe, L. C., & Hamzah, M. A. (2004). Relationship between macroeconomic variables and stock market indices: Cointegration evidence from stock exchange of Singapore's All-S sector indices. Jurnal Pengurusan, 24, 47–77.

Mukherjee, T. K., & Naka, A. (1995). Dynamic relations between macroeconomic variables and the Japanese stock market: An application of a vector error correction model. Journal of Financial Research, 18(2), 223–237.

Naiifar, N. (2016). Do global financial distress and uncertainties impact GCC and global sukuk return

dynamics? *Pacific-Basin Finance Journal*, 39, 57–69.

Nishat, M., & Shaheen, R. (2004). *Macroeconomic factors and the Pakistani equity market. The Pakistan Development Review*, 43(4), 619–637.

Pesaran, M. H., & Shin, Y. (1999). *An autoregressive distributed-lag modelling approach to cointegration analysis. Econometric Society Monographs*, 31, 371–413.

Pesaran, M. H., Shin, Y., & Smith, R. J. (2001). *Bounds testing approaches to the analysis of level relationships. Journal of Applied Econometrics*, 16(3), 289–326. <https://doi.org/10.1002/jae.616>

Rashid, A. (2011). *Stock prices and exchange rates: Are they related? Evidence from South Asian countries. Pakistan Economic and Social Review*, 49(2), 163–181.

Rehan, R. (2023). *Interest rate and financial performance of banks in Pakistan. Journal of Banking & Finance*, 150, 105–120.

Rehman, M. (2018). *The relationship between stock market volatility and macroeconomic volatility: Evidence from Pakistan. International Research Journal of Finance and Economics*, 166, 172–183.

Rizvi, S. A. R., Dewandaru, G., Bacha, O. I., & Masih, M. (2014). *An analysis of stock market efficiency: Developed vs Islamic stock markets using MF-DFA. Physica A: Statistical Mechanics and its Applications*, 407, 86–99.

Rogalski, R. J., & Vinso, J. D. (1977). *Stock returns, money supply and the direction of causality. Journal of Finance*, 32(4), 1017–1030.

Saleem, F. (2023). *Causal relationship between macroeconomic variables and stock prices in Pakistan. Journal of Economic Studies*, 50(2), 210–225.

Shiller, R. J. (2000). Irrational exuberance. Princeton University Press.

State Bank of Pakistan. (2024). Islamic Banking Bulletin. SBP.

Wongbangpo, P., & Sharma, S. C. (2002). Stock market and macroeconomic fundamental dynamic interactions: ASEAN-5 countries. Journal of Asian Economics, 13(1), 27–51.

Yasir, M. (2023). An empirical study of macroeconomic factors and stock returns in Pakistan. Journal of Finance and Accounting, 11(3), 45–60.

PAKISTAN'S WHEAT PARADOX: SELF-SUFFICIENCY AMIDST RISING IMPORTS AND POLICY CHALLENGES

Dominance

Farahnaz Gilal, Jam Ghulam Murtaza Sahito, Habibullah Magsi

Department of Agricultural Economics, Sindh Agriculture University, Tandojam
Department of Basic and Agribusiness Management, Khairpur College of Agricultural &
Management Science (KCAMS)

Corresponding Author: hmagsi@sau.edu.pk

ABSTRACT

This study aims to examine the food security conditions of Pakistan in the context of wheat, as it is a significant food crop consumed all over the country. The major objective of the study was to assess the current status of food security in Pakistan and analyze the trends in wheat production and consumption. Secondary data were obtained on production, consumption, imports, and exports of wheat from the United States Department of Agriculture (USDA) for the years 2001-2024. The results found that the production of wheat has increased over the past 24 years despite facing fluctuations. However, on the other hand, consumption has continuously risen over the years, with the per capita consumption reaching approximately 124 kgs/person. Results showed a minimal increase in exports, while a huge rise was seen in imports to meet the growing domestic demand. The results further found that wheat availability has also gradually increased over time, but the gap between the quantity of wheat available and its consumption still persists. The study concluded that Pakistan is self-sufficient in wheat production and is a food secure country, but due to certain issues and mismanagement of resources, it has to import a huge quantity of wheat to feed its nation. Therefore, Pakistan must focus on addressing these issues by adopting high-yielding, climate-resilient varieties, modern agricultural practices, efficient use of quality inputs, and improved water management. Consistent policies of government, investments in research, and careful management of wheat imports are also crucial for minimizing reliance on imported wheat and ensuring food security in the country.

Keywords: *Wheat, Wheat availability, Consumption, Food security.*

Introduction

Food security is when all people, at all times, have social, economic, and physical access to sufficient, safe, and nutritious food that meets their dietary needs and food preferences for an active and healthy life," World Food Summit (1996).

The Food and Agriculture Organization (1996) defined four dimensions of food security, i.e., availability, accessibility, utilization, and stability. Food availability ensures the consistent availability of food for all individuals. In contrast, accessibility ensures access to nutritious food, utilization involves the proper food storage and processing practices, and stability ensures adequate food availability without any hindrance.

Pakistan has been ranked 109th out of 127 countries by the Global Hunger Index (GHI, 2024), showing a score of 27.9, which indicates that a "serious" level of hunger is prevailing in the country. Pakistan's total population is 207.7 million, and approximately 20.5% of the population is malnourished, and 44% of children under five are stunted (Rehman et al., 2023). Food availability is an important determinant of the nutritional status of the population. Availability of food is determined by the level of domestic food production, the level of domestic food stock levels, and the country's ability to import supplies, in addition to its availability. Mittal and Sethi (2009) stated that food availability is a crucial factor for achieving food security. Similarly, FAO (2006) also reported that food security greatly depends on food availability, the first dimension of food security. It indicates the physical quantity of food available in adequate quality, supplied and distributed through domestic production or imports.

As the world population is anticipated to increase, there will be a substantial increase in the demand for agricultural production (FAO et al., 2022). It is forecasted that by 2050, the world's requirement for food will increase as it is anticipated that the global population will surpass 10 billion (Morchid et al., 2024).

However, to meet this increasing demand and to fulfill the requirements of the increasing population, food production must be increased by about 70 percent (Giller et al., 2021).

As the global population increases, demand for agricultural production, including wheat, must increase. Similar to other developing countries, Pakistan is also struggling to balance its wheat production with its rising consumption requirements. Wheat is considered Pakistan's staple cereal crop, and critical for meeting the dietary needs of poor people. It is a part of daily consumption by a large portion of the population, playing a key role in assuring food security conditions of Pakistan (Pervaiz & Manzoor, 2025). The production of wheat significantly affects the overall economic growth, import bill, and nutritional status of a highly wheat-dependent poor population (Koonthar et al., 2018).

In Pakistan, wheat is grown on about 8.9 million hectares of land, constituting 40% of the total land irrigated (USDA, 2023). The current ongoing challenges, such as high food and input prices, potential climate shocks, and limited livelihood opportunities, continue to impact food security (IPC, 2024). In fiscal year 2025, wheat production has declined by approximately 8.9 percent from the record high production of about 31.81 million tonnes in the last fiscal year 2024, where the decline is linked to a reduction in area cultivated, dry spells, and high temperatures during the season of sowing (GoP, 2025).

Pakistan's Food security is closely related to the production and consumption of wheat. The availability of wheat for consumption is directly affected by its level of production. Rahman et al. (2021) analyzed Pakistan's food security conditions, and the findings revealed that Pakistan is a comparatively food insecure country due to inadequate food availability. Some studies have shown that the quantity of wheat available for consumption has decreased in recent years. However, according to Tariq et al. (2014), increasing per capita availability of wheat is important to meet the sustainable food security conditions in Pakistan.

In Pakistan, the estimated consumption of wheat flour is 124/kg/capita/annum. According to the National Food Security and Research Ministry's estimations, about 6.934 million metric tons of wheat are available to meet domestic demand. Pakistan Agriculture Storage and Supplies Corporation (PASSCO) had 1.78 million tons of wheat stock, which was assumed to be sufficient till 2024 (MNFSR, 2023). It is also forecasted that consumption will increase to 30.9 million tons with an annual growth of 2.3% in the year 2024-25 (USDA, 2024).

The increasing population of Pakistan is frequently causing an increase in the demand for wheat, which is further worsening the food security conditions. The rapidly growing population is leading Pakistan towards potential food shortages, threatening the country's ability to meet the sufficient quantity of food availability (Shah et al. 2021; Islam & Shehzad, 2022). If the population continues to grow at the current rate, it is highly estimated that by 2050, Pakistan will move from the 6th position in the world population to 4th position (Ahmad & Farooq, 2010). To meet food security, with the reduction of population, it is very necessary to increase the yield of the wheat crop (Islam, 2015). Tariq et al. (2014) reported that per capita availability of wheat would be 105 kg per annum in 2031 and 84 kg per annum in 2050 due to the rising trend of population and adverse climatic effects.

Climate change has been shown to negatively affect wheat production due to increased temperatures and erratic rainfall patterns (Rizwan et al., 2024). In irrigated regions, rising temperatures during critical months adversely impact yields, while rainfall variability further complicates production (Tariq et al., 2014). Abrar and Maryam (2023) in their study investigated climate change effects on the food security conditions in Pakistan and noted that a minimum rise in temperatures has resulted in a decrease of 8.87 kg in wheat yield, ultimately threatening food security in the country.

Global events like the Russia-Ukraine war and COVID-19 pandemic have severely disrupted wheat production and supply chains, leading to increased reliance on imports (Tahir & Khan, 2024) In the year

2023-2024, despite a minor decline in the area planted, wheat production hit 27.0 million tons, marking a 2 percent increase compared to the previous year (2022-23). However, with consumption growth anticipated to outpace production, wheat imports for 2023-24 rose to 2.6 million tons (IPC, 2024).

Due to supply disruption from Ukraine, Pakistan's wheat imports from Russia have seen a drastic rise of more than eightfold. Pakistan, a country with one of the highest populations in the world, has become the fifth-largest importer of Russian wheat. The reliance on imports raises concerns about food security, prompting calls for increased domestic production through innovative agricultural practices (Shaheen et al., 2022).

The government of Pakistan has always been actively involved in the wheat sector of the economy to ensure food security and achieve self-sufficiency in wheat production. The government provides different subsidies for wheat farmers, provides minimum support prices (MSP), and procurement prices to facilitate wheat production in Pakistan. The minimum support prices increase the wheat production, while on the other it increases the burden on the government and also make it less competitive in international markets due to rising production costs (Shahzad et al., 2019).

In conclusion, the latest literature suggests that wheat availability in Pakistan is affected by a multifaceted interplay of several challenges, including climate change, economic policies, and agricultural practices. To address these complex challenges, a holistic strategy is required to ensure stable wheat production and availability in the country. Therefore, based on the available literature, this study aims to assess the current status of food security in Pakistan regarding wheat availability and to analyze wheat production and consumption trends and their supply-demand gap.

Materials and methods

Food security is a difficult and complex subject. Wheat is Pakistan's key component and is significant in maintaining its food security. A comprehensive review of the literature was conducted on the production, consumption, and availability of the wheat crop in Pakistan. Secondary data were utilized to achieve the aim of this study, which was to find Pakistan's current food security status. Time series data were collected from the United States Department of Agriculture (USDA) on production, consumption, imports, and exports of wheat from the years 2001-2024.

Analytical measures

All the data collected were computed in the tables in MS Excel, and then the inferences were made using descriptive statistics such as tabulation and graphs.

The availability of wheat is measured as the total quantity of crop produced by the country where imports are added, and the exports are subtracted. Kyaw (2009) explained food availability as the total amount of food required by any country. Wheat availability was measured using the formula:

Availability=Production+Imports-Exports

The gap between the available wheat quantity and its consumption was calculated as:

Gap=Available wheat-wheat consumption

Data is presented using visually distinct tables and graphs to help readers understand critical aspects of the study. It provides a clear insight into production, consumption, imports, exports, and their relationship with wheat availability

Results

This chapter presents the results based on the available data, descriptive statistics, and visualization

Wheat production status

Wheat is considered the major food crop and is harvested in all four provinces of Pakistan. The production of the wheat crop has been fluctuating, with some years showing an increase and others showing a decline. Despite fluctuations, the overall trend indicates growth in wheat production capacity over the 25 years. The increase in production in recent years can be attributed to the increased area, availability of good quality seeds, fertilizers, favorable weather conditions, and also timely government decisions.

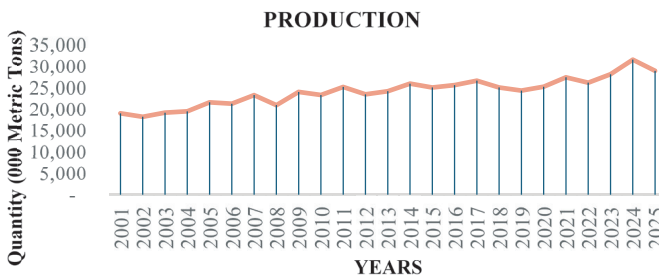


Fig. 1 Trend of wheat production in Pakistan

Wheat consumption status

Despite being an agrarian country, we have to import wheat to meet the consumption requirements of the people. The consumption of the wheat crop in Pakistan has been increasing for the past 24 years. The consumption trend may be increasing due to several factors such as the continuously increasing rate of population, urbanization, and changes in diet, and it is forecasted that consumption will further increase in the coming years.

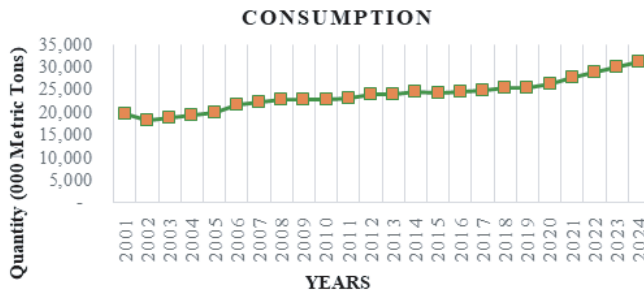


Fig. 2 Wheat consumption in Pakistan

Wheat export status

Wheat is one of the major crops grown in Pakistan, and its exports could be a valuable source of foreign exchange earnings and can play a vital role in the economic growth of the country. In 2023, Pakistan was ranked as the 106th exporter of wheat crop in the world out of 135 countries. The ranking shows the minimal contribution of Pakistan in the world's wheat export markets. The country's wheat export data have seen serious ups and downs and have been unstable over the past 24 years.

A significant decrease can be seen in the quantity of wheat exported by Pakistan in the last few years. This decline is attributed to the limited domestic production, making it difficult to meet consumption requirements. The situation has caused government officials to ban the export of wheat in order to meet domestic needs as a first priority



Fig. 3 Pakistan's wheat exports

Wheat import status

Pakistan is among the major wheat producing countries in the world, still it has been importing wheat to meet its domestic demand. It could be seen that Pakistan has been importing wheat for almost the last 2 decades. This increasing trend of wheat imports in the last few years highlights the need for Pakistan to focus on increasing its production to meet its domestic needs.

However, in the last fiscal year, the Pakistani government had put restrictions on imports of wheat due to the availability of higher wheat stocks from last year's bumper production. The decision was made to protect the

farmers and to ensure the country's self-sufficiency in food production.



Fig. 4 Pakistan's wheat imports

Wheat availability

Being one of the most important cereal crops consumed by the majority of the population, the availability of wheat plays a significant role in ensuring food security in Pakistan. Figure 5 shows that wheat availability has gradually increased over the past 24 years. In some years, the quantity of wheat available for consumption has increased due to huge quantities of wheat being imported. Whereas in certain years the increase is due to an increase in support prices, which resulted in bumper wheat productivity, ultimately increasing its availability.



Fig. 5 Wheat availability trend in Pakistan (Author's calculations)

Wheat availability gap

The following Figure 6 shows that overall, there has been a significant increase in both the quantity available and its consumption. This gap is mainly caused due to decrease in production, area under wheat production, weather conditions, availability and quality of seeds, fertilizers, timely irrigation, and many more reasons. Meanwhile, on the other hand, increased consumption levels also worsened the situation.

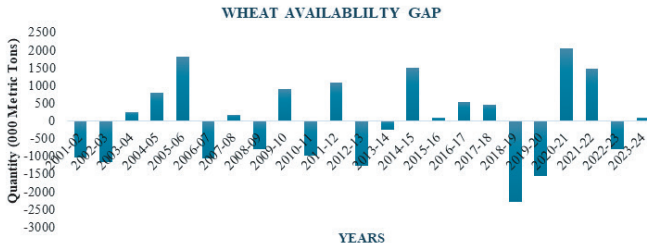


Fig. 6 Gap between the quantity of wheat available and its consumption in Pakistan
Authors calculations

Discussion

This section discusses the results of this study and compares them with the previous studies. Wheat is a major crop grown in the country, and its availability plays a significant role in meeting the dietary needs of the population and maintaining food security.

The study revealed an overall increase in the production of wheat crop in despite severe fluctuations in several years. The findings are in accordance with the results of a study conducted by Islam et al. (2023), which also reported an increase in both area and production. The increase is attributed to favorable weather conditions and supportive government policies. On the other hand, wheat consumption has consistently shown an increasing trend over the past 2 decades, primarily due to a rapidly growing population. In contrast to our findings, the study of Akram and Henneberry (2016) reported that there was a reduction in wheat consumption in Pakistan due to a huge shift towards other fast food items.

Our results have shown a decline in the quantity of wheat exports and a steady rise in imports. Similar to findings of (Mustafa & Hussain, 2023), stating that the decline in wheat exports has led to an increasing trade deficit, with

exports decreasing from 16% to 10% of GDP over the past twenty years. Whereas, Abbas et al. (2007) have found that domestic wheat production in Pakistan has been facing serious fluctuations, where most of the time it is lower than the quantity demanded for consumption, so to meet the needs, imports are made. The recent surge in Pakistan's imports from Russia also emphasizes Pakistan's dependency on foreign sources. The study has further found an increase in the quantity of wheat available due to both increased production and imports. However, the gap still persists between the quantity available and consumption. According to the Ministry of National Food Security and Research (MNFSR, 2025), about 33.47 MMT of wheat is available for consumption in the current fiscal year compared to the domestic requirement of 33.58 MMT.

Conclusion and recommendations

Wheat holds a central role in Pakistan's economic background, serving as the staple food crop and being widely consumed all over the country. It is concluded from the above study that the overall production of the wheat crop in Pakistan has shown an increasing trend, but still remains vulnerable to fluctuations. On the other hand, its consumption is rising continuously due to population growth and changing dietary patterns, which sometimes causes a shortage of wheat in the country. According to a report by the USDA (2024), wheat makes up 72 percent of Pakistan's daily calorie intake, with a yearly consumption rate of over 124 kgs. The study also identified a gap between the quantity of wheat available and its demand, which was estimated to be about 5.36 percent. The results further revealed that to fill this gap, a huge amount of wheat is imported to meet domestic demand. Despite being an agrarian country having the potential to meet its requirements, Pakistan heavily relies on imports to meet its domestic consumption needs. This reliance on imports is burdening Pakistan's economy with heavy import bills, which is already not in a very good situation. The study concluded that Pakistan can self-sufficiently produce wheat to meet its domestic

demand, but due to mismanagement of resources and increasing problems in the agricultural sector are affecting the nation's food security situation.

To tackle the disparity between wheat production and consumption in Pakistan, it is vital to increase productivity by utilizing high-yield, climate-resilient varieties and modern agricultural practices. Making efficient use of quality seeds, fertilizers, and enhanced water management methods can greatly help to improve yield. Moreover, consistent government policies, investments in research, and careful management of wheat imports can help minimize reliance on imported wheat.

Authors contributions

All the authors have the same level of contribution from idea development to data collection, analysis, and writeup of the manuscript

Conflict of Interest

There is no conflict of interest.

References

Abbas, M., Sheikh, A. D., Shahbaz, M., & Afzaal, A. (2007). *Food security through wheat productivity in Pakistan*. *Sarhad Journal of Agriculture*, 23(4), 1239.

Abrar, M. A., & Maryiam, M. (2023). *Climate change impact on food security in Pakistan*. *Pakistan Journal of Multidisciplinary Research*, 4(1), 131-146.

Ahmad, M., & Farooq, U. (2010). *The state of food security in Pakistan: Future challenges and coping strategies*. *The Pakistan Development Review*, 903-923. <https://doi.org/10.30541/v49i4Ipp.903-923>

Akram, W., & Henneberry, S. (2016). *Consumption patterns of urban Punjab of Pakistan: Evidence from HIES 2013-14*. <https://doi.org/10.22004/ag.econ.237308>
FAO. (1996). *Rome Declaration on World Food Security and World Food Summit Plan of Action: World Food Summit; Food and Agriculture Organization (FAO), United Nations: Rome, Italy*. <https://www.fao.org/3/w3613e/w3613e00.htm>

FAO. (2006). *Food and Agricultural Organization of the United Nations (FAO) Agriculture and Development Economics Division, Policy Brief, June 2006, Issue 2*
FAO. (2022). *The State of Food Security and Nutrition in the World 2022: Repurposing food and agricultural policies to make healthy diets more affordable, The State of Food Security and Nutrition in the World (SOFI)*. Rome, Italy.

GHI. (2024). *Pakistan. Global Hunger Index (GHI)*. Peer-reviewed annual publication designed to comprehensively measure and track hunger at the global, regional, and country levels. <https://www.globalhungerindex.org/pakistan.html#:~:text=%E2%89%A4%209.9,6.1%25>

Giller, K.E., Delaune, T., Silva, J.V., Descheemaeker, K., van de Ven, G., Schut, A.G.T., van Wijk, M., Hammond, J., Hochman, Z., Taulya, G., Chikowo, R., Narayanan, S.,

Kishore, A., Bresciani, F., Teixeira, H.M., Andersson, J.A., van Ittersum, M.K. (2021). *The future of farming: Who will produce our food? Food Security*. 13, 1 0 7 3 – 1 0 9 9 .
<https://doi.org/10.1007/s12571-021-01184-6>.

GoP. (2025). *Economic Survey of Pakistan*. Ministry of Finance. Ministry of Finance |Government of Pakistan |
IPC. (2024). *PAKISTAN IPC ACUTE FOOD INSECURITY ANALYSIS*.
<chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/>
https://www.ipcinfo.org/fileadmin/user_upload/ipcinfo/docs/IPC_Pakistan_Acute_Food_Insecurity_Mar_Nov2024_Report.pdf

Islam, M. (2015). *Factors affecting major food crops production, a case study of district Bahawalpur. (M.Phil Applied Statistics analysis on Agriculture Data)*, The Islamia University of Bahawalpur.

Islam, M., & Shehzad, F. (2022). *A Prediction Model Optimization Critiques through Centroid Clustering by Reducing the Sample Size, Integrating Statistical and Machine Learning Techniques for Wheat Productivity*. *Scientifica*, 2022, 1–11.
<https://doi.org/10.1155/2022/7271293>

Islam, M., Shehzad, F., Qayyum, A., Abbas, M. W., & Siddiqui, R. (2023). *Growth Analysis of Production of Food Crops and Population Growth for Food Security in Pakistan: Growth Analysis of Production of Food Crops and Population*. *Proceedings of the Pakistan Academy of Sciences: B. Life and Environmental Sciences*, 60(1), 83-90. [https://doi.org/10.53560/PPASB\(60-1\)762](https://doi.org/10.53560/PPASB(60-1)762)

Koondhar, M. A., Qiu, L., Magsi, H., Chandio, A. A., & He, G. (2018). *Comparing economic efficiency of wheat productivity in different cropping systems of Sindh Province, Pakistan*. *Journal of the Saudi Society of Agricultural Sciences*, 17(4), 398-407.
<https://doi.org/10.1016/j.jssas.2016.09.006>

Kyaw, D. (2009). *Rural Household's Food Security Status and Coping: Strategies to Food Insecurity in Myanmar*. V.R.F. Series, No. 444, Institute of Developing Economies, Japan External Trade Organization. <https://www.ide.go.jp/library/English/Publish/Reports/Vrf/pdf/444.pdf>

Mittal, S., & Sethi, D. (2009). *Food security in South Asia: Issues and opportunities (No. 240)*. working paper. <https://www.icrier.org/pdf/WorkingPaper240.pdf>

MNFSR. (2023). (Ministry of National Food Security & Research. Available at <https://mnfsr.gov.pk/NewsDetail/ZGI3ODg2MDAtZTA0Zi00NmVjLWFmN2UtYTI5ZWQzYzE2ZWVm>

MNFSR. (2025). Ministry of National Food Security & Research. <https://mnfsr.gov.pk/NewsDetail/ZGI3ODg2MDAtZTA0Zi00NmVjLWFmN2UtYTI5ZWQzYzE2ZWVm>

Morchid, A., Muhammad Ablushi, I.G., Khalid, H.M., El Alami, R., Sitaramanan, S.R., & Muyeen, S.M. (2024). *High-technology agriculture system to enhance food security: A concept of smart irrigation system using Internet of Things and cloud computing*. *Journal of the Saudi Society of Agricultural Sciences*. <https://doi.org/10.1016/j.jssas.2023.09.007>

Mustafa, G., & Hussain, S. (2023). *What are the Factors Making Pakistan's Exports Stagnant? Insight from Literature Review*. *The Pakistan Development Review*, 62(3), 449-460. <https://doi.org/10.30541/v62i3pp.449-460>

Pervaiz, B., & Manzoor, M. Q. (2025). *An Integrated Assessment of Climatic and Non-Climatic Determinants of Wheat Production and Food Security in Pakistan*. *Regional Lens*, 4(1), 114-126. <https://doi.org/10.62997/rl.2025.41046>

Rahman, I. U., Khattak, S. W., Israr, M., & Hashim, S. (2021). *A multi-dimensional analysis of food security situation in Pakistan: the way forward*. *Sarhad Journal of*

Agriculture, 38(1), 170-178.
<https://dx.doi.org/10.17582/journal.sja/2022/38.1.170.178>

Rehman, R., Sadiq, S., Khan, S. U., & Gul, A. (2023). Long Term Trends in Rainfall and Temperature Effects on Food Security in Pakistan: An Analysis of 75 Years (1947-2021). *Qlantic Journal of Social Sciences*, 4(3), 55-68. <https://doi.org/10.55737/qjss.000490202>

Rizwan, M., Aman, M. K., Haider, M. J., Raza, H. M. M., Saqib, M., & Malik, A. (2024). *Wheat Under Pressure: Assessing the Influence of Climate Change on Pakistan's Agricultural Landscape*. Authorea Preprints. 10.22541/au.171142989.95052132/v1

Shah, M. I., Shehzad, F., & Omar, M. (2021). Modeling Wheat Productivity using Hierarchical Regression: A way to Address Food Security Concerns. *Elementary Education Online*, 20(2): 1184-1195 (2021). DOI:10.17051/ilkonline.2021.02.134

Shaheen, S., Almas, L. K., & Usman, M. (2022). *Wheat Consumption Determinants and Food Security Challenges: Evidence from Pakistan*. *WSEAS Transactions on Environment and Development*, 18, 427-441. <https://doi.org/10.37394/232015.2022.18.42>

Shahzad, M. A., Razzaq, A., & Qing, P. (2019). On the wheat price support policy in Pakistan. *Journal of Economic Impact*, 1(3), 80-86. DOI:10.52223/jei0103192

Tahir, N., & Khan, A. H. (2024). *Global Shocks and Local Impacts: A CGE Analysis on the Impact of COVID-19 and Russia-Ukraine Conflict on Pakistan's Wheat Sector*. *International Journal of Social Science & Entrepreneurship*, 4(2), 379-399. <https://doi.org/10.58661/ijssse.v4i2.284>

Tariq, A., Tabasam, N., Bakhsh, K., Ashfaq, M., & Hassan, S. (2014). *Food security in the context of climate*

change in Pakistan. Pakistan Journal of Commerce and Social Sciences (PJCSS), 8(2), 540- 550.
[https://doi.org/10.36902/rjsser-vol3-iss4-2022\(141-148\)](https://doi.org/10.36902/rjsser-vol3-iss4-2022(141-148))

United States Department of Agriculture. (2023). Pakistan Grain and Feed Annual.
https://apps.fas.usda.gov/newgainapi/api/Report/DownloadReportByFileName?fileName=Grain%20and%20Feed%20Annual_Islamabad_Pakistan_PK2023-0008.pdf
United States Department of Agriculture. (2024).

Pakistan Grain and Feed Annual.
[chrome-https://apps.fas.usda.gov/newgainapi/api/Report/DownloadReportByFileName?fileName=Grain%20and%20Feed%20Annual_Islamabad_Pakistan_PK20240003#:~:text=Growing%20at%20an%20annual%20rate,million%20tons%20\(Table%202\).](https://apps.fas.usda.gov/newgainapi/api/Report/DownloadReportByFileName?fileName=Grain%20and%20Feed%20Annual_Islamabad_Pakistan_PK20240003#:~:text=Growing%20at%20an%20annual%20rate,million%20tons%20(Table%202).)

GREEN HRM AND ORGANIZATIONAL CITIZENSHIP BEHAVIOR FOR SUSTAINABLE ECONOMIC PERFORMANCE: A CASE FROM AN EMERGING ECONOMY

Dominance

*Dr. Mustaghis ur Rahman ,
Muhammad Faraz*

ABSTRACT

Green Human Resource Management (GHRM) is a growth area that many organizations in emerging economies are adopting as they grapple with sustainability issues. Sustainability is of great importance worldwide, and in developed countries, we see companies adopting GHMR as a method to achieve, at the same time, economic success and environmental stewardship. This study looks at the relationships between the elements of GHRM practice (green recruitment, green training, green performance management) and what it does for a company's economic performance, which we see plays a mediating role in Green Organizational Citizenship Behavior (GOCB). We base this research on two theory models -- the Ability-Motivation-Opportunity (AMO) model and Social Exchange Theory, which we use to study the results of GHRM. We used a quantitative method, which included survey responses from 150 HR personnel in 38 multinational firms in Pakistan. We analyzed the data using Structural Equation Modeling (SEM) in Smart PLS 4.0. The SEM analysis we did shows that GHMR practices play a dual role of direct and indirect through GOCB, which is an indirect play in improving a company's economic performance. What we find is that the value of putting sustainability into HR systems, which in turn fosters a workplace environment that encourages pro-environmental behavior, which in turn produces positive economic results. This study, which is adding to a very small set of research out of South Asia, particularly Pakistan, presents the results of GHMR in a developing economy setting. We put forth that for

management and policy-making professionals, it is to their benefit to develop integrated green HR strategies that put companies' environmental responsibilities into play as a part of their competitive advantage.

Keywords:

Green Human Resource Management (GHRM), Green Organizational Citizenship Behavior (GOCB), Sustainable Economic Performance, Emerging Economies, AMO Framework, Environmental Sustainability in HRM

Senior Professor at the Department of Management Studies, BBBSK, Bahria University Karachi. Email: mustaghis.bukc@bahria.edu.pk

Associate Professor, HoD, COMS, N.N Campus Karachi Institute of

Economics and Technology (KIET), Email: syedakazmi44@gmail.com

Assistant Professor at the Department of Business Studies, BBSK, Bahria

University Karachi. Email: mfaraz.bukc@bahria.edu.pk

Introduction

The escalating global environmental crisis poses severe risks to public health and economic stability. For example, the World Health Organization reports that 90% of pollution-related deaths occur in low- and middle-income countries. In Pakistan, rapid industrialization has intensified environmental degradation, making corporate sustainability efforts an urgent priority. Recognizing the environmental challenges facing humanity, the United Nations adopted Sustainable Development Goal (SDG) 13: Climate Action in 2015, to call for collective action to reduce environmental risk. In response to climate action and environmental protection, Green Human Resource Management (GHRM) has been identified as a key business strategy to reduce organizations' environmental footprints and promote a sustainability-focused workplace culture (Renwick et al., 2013).

Although GHRM has gained traction in practice, there is still debate about its economic implications. For instance, some research suggests that GHRM practices such as eco-friendly recruitment, training, and green incentives improve company image, innovation, and efficiency and ultimately enhance economic performance

(Masri & Jaaron, 2017; Sathyapriya et al., 2013). Conversely, some researchers claim that investments in environmental sustainability do not always produce a financial return, thus leaving a gap in the understanding of how organizations can effectively link GHRM and profitability (Yong et al., 2019). It is also important to note that although there is a wealth of literature available on GHRM in developed countries, there is little empirical research available from developing countries, including Pakistan, where environmental regulations and corporate sustainability commitments continue to evolve. Therefore, this study aims to address this gap by examining the relationship between GHRM and the economic performance of organizations in Pakistan and investigating whether Green Organizational Citizenship Behavior (GOCB) - employees' voluntary pro-environmental behaviors - will mediate this relationship.

GHRM represents an intersection point of environmental sustainability and human capital management. Opatha and Arulrajah (2014) describe GHRM as the implementation of HR policies that raise awareness of the environment and transform employees into "green employees" who engage in activities to promote sustainability within organizations. There are three primary components of GHRM, including: a) Green Recruitment: employing individuals with expertise and/or a commitment to sustainability; b) Green Training: educating employees on sustainable practices and environmental objectives; and c) Green Rewards: providing incentives for employees to demonstrate eco-friendly behavior. From a theoretical perspective, incorporating sustainability in HRM is expected to positively affect employee involvement, innovation, and operational efficiency (Wagner, 2013; Longoni et al., 2018). However, for organizations to integrate the "green" concept into their culture, they require strategic planning beyond ad hoc efforts. Anwar et al. (2020) recommend that sustainability-focused HRM must incorporate green performance evaluations, environmentally responsible operational procedures, and

systematic sharing of knowledge to realize long-term environmental and economic successes. In summary, GHRM can be seen as a method to achieve the Triple Bottom Line - economic, social, and environmental success - through people management (Jabbour et al., 2010; Ren & Jackson, 2020).

Advanced HR Technologies, Green Analytics, and Information Systems

Modern HRIS (Human Resources Information Systems) and "Green" HR Platforms will allow organizations to implement digital versions of all their HR Processes (e.g., using electronic contracts instead of paper contracts, digital pay slips instead of paper pay slips, etc.) and be able to measure environmental performance indicators for HR activities. For example, data-driven green HR analytics could analyze metrics such as: How much energy was saved because employees were working remotely? Or: what amount of waste was reduced because training was digitalized? This would give organizations evidence of the impact of GHRM and provide a framework for ongoing improvement. Using technology in the same way that organizations use it today to support other management functions supports the concept of business informatics, which emphasizes the application of information systems to improve the functionality of businesses and management practices (National Research University – Higher School of Economics, 2025).

Providing remote work options through the use of ICT infrastructure, which also provides flexibility to employees and at the same time reduces commuting carbon emissions. Also, technology-enabled HR practices put in by organizations can help them gain economic and environmental benefits (Walentek, 2020).

In brief, human resources technologies and green HR act as catalysts that drive GHRM results, which in turn see to it that sustainability principles are fully integrated into HRM and made to align with the organization's strategy.

If that happens, the questions arises, what do GHRM practices do to promote pro-environmental behaviors of employees? And to what degree do organizations see financial benefits from putting in place GHRM practices? Address at present is what is required as we see an increase in which stakeholders are pushing companies to adopt sustainable business practices (Hameed et al., 2020). While many firms have made the shift from traditional methods to environmental responsibility on a large scale, what that does for companies in a context like Pakistan's industrial sector is still very much a question. By looking at the case of Pakistan's Industrial Sector, which is seeing to deal with ever greater environmental issues from emissions to waste disposal, we present empirical research into whether or not Green HR strategies improve economic performance or, in fact, put a financial strain on businesses.

This Study reports three things. First, we look at which GHRM play out in terms of Economic gain, we study the role of Employees' Voluntary Green behaviors. This responds to the recent requirement to put micro-level behavioral results into strategic HRM research for sustainability (Tang et al., 2018). Also, we report that we took GHRM out of the Western settings into an emerging economy context, which to date is under studied, and we present how GHRM plays in different regulatory and cultural settings (Aftab et al., 2023). Also, we report on the economic value of sustainable HRM strategies, which we put forth as a business case for environmental responsibility in Pakistan's corporate sector. We aim to use these findings to guide policy makers and business leaders in the design of HR strategies that put environmental stewardship and economic growth together and in turn, bridge the gap between profitability and sustainability.

Literature review

Literature has been explored on the key concepts and variables of this research to see to what extent the scientific knowledge on the subjects have already been developed by the researchers of management sciences with reference to the influences of green human resource management on the economic performance of companies.

GHRM and Organizational Economic Performance

GHRM Refers to a Bundle of HR Practices and Policies Oriented Toward Environmental Sustainability. Examples of GHRM Include: Green Recruitment and Selection; Training and Development Programs that Focus on Environmental Issues; Performance Appraisal Programs that Measure Employees' Performance Based on Their Commitment to Sustainability; and Compensation Policies that Incorporate Environmental Criteria (Renwick et al., 2013; Tang et al., 2018). The Goals of GHRM Are to Develop Employees' Green Knowledge and Skills, Motivate Pro-Environmental Behavior, and Create an Organizational Culture Committed to Sustainability.

Prior Studies Have Linked GHRM to Improved Environmental Outcomes Such as Lower Waste and Emissions (Haddock-Millar et al., 2016; Zibarras & Coan, 2015). Furthermore, Prior Studies Have Identified the Implementation of GHRM as Key to Effective Sustainable Strategy Execution, as It Aligns the Workforce with the Organization's Environmental Goals (Shen et al., 2018; O'Donohue & Torugsa, 2016). By Integrating Environmental Criteria into HR Processes (e.g., Including Sustainability in Job Descriptions and Performance Indicators), Organizations Signal the Importance of Sustainability and Hold Employees Accountable for Environmental Performance (Shen et al., 2018; O'Donohue & Torugsa, 2016).

The GHRM may have additional economic implications. An organization's environmental responsibility could help improve productivity (via energy saving); lead to new product development and processes; enhance the organization's reputation; and strengthen stakeholder

relationships -- all of which could lead to greater financial performance. Research has shown that GHRM practices do improve firm performance. Ghouri et al. (2020) in Malaysia were able to demonstrate that GHRM significantly improves firm performance through better resource utilization. Aftab et al. (2023) in a developing country setting showed that GHRM is positively related to an organization's environmental performance and that this relationship was enhanced through "green innovation" and "green strategic planning." Similarly, Yang and Li (2023) demonstrated that GHRM has a significant influence on employees' green innovative behavior; green organizational commitment served as a mediator, and knowledge sharing served as a moderator, thereby enhancing the organization's sustainable performance outcomes.

More recently, Jackson et al. (2022) in Business Strategy and the Environment reviewed the research and concluded that organizations that align their HRM strategies with their environmental strategies will experience competitive advantages and greater financial performance. However, there are limitations to the GHRM--performance linkage. Yong et al. (2019) stated that without proper alignment, environmental initiatives may generate costs or distract from other organizational functions before generating returns on investment. Therefore, there is a need to investigate how GHRM generates economic benefits, and under what conditions. Another area of research that has emphasized the role of technology and data analytics tools in enabling GHRM and linking GHRM to performance and GOCB. Many companies are now utilizing data systems and digital tools to implement GHRM programs. For example, HRM cloud-based systems enable companies to collect and analyze data regarding employees' environmental behaviors. This enables them to identify which GHRM practices have the greatest effect on performance. Lorek (2019) noted that when IT systems are appropriately aligned, they can assist in the monitoring and controlling of organizational resources in real-time (e.g., energy management systems, carbon footprint tracking). Such systems can serve as decision support systems for

sustainability initiatives. Organizations may also put in place these systems with HRM, which, for instance, may include tracking each department's eco initiatives or employees' green ideas via an intranet portal, thus providing a base to measure the association between GHRM and the organization's performance and cost savings.

Also, technology platforms play a great role in the exchange of information related to sustainability. Internal social networks or green idea repositories allow employees to put forth and learn from each other on environmental practices -- which in turn may secondarily improve GOCB by the fact that we have an informed and engaged workforce. Walentek (2021) reported that management and control of teleworkers is a challenge in terms of a lack of face-to-face interaction with staff, which in turn puts forward the need for digital communication and monitoring tools to maintain company culture and expectations as employees work remotely. Digital tools may be used to support GHRM goals (for instance, reminding remote workers to save energy or to recognize their green input via an online platform). In the end use of data analysis and technology in HRM not only improves the implementation of green HRM practices but also increases their overall positive effect on organizational performance and employee green behavior. This point of view on GHRM is part of the bigger Business Informatics trend of using information systems to add value -- which means companies with complex HRIS will be able to better see the relationship between GHRM, GOCB, and performance.

Technology-enabled HR and green IS indicate that the magnitude of the GHRM's effects may be dependent upon the digital infrastructure that enables employees to take action, which motivates investigating behavioral pathways such as GOCB.

GHRM and Green Organizational Citizenship Behavior (GOCB)

Green Organizational Citizenship Behavior (GOCB) encompasses employees' discretionary, extra-role behaviors that contribute to environmental sustainability within the organization. Examples of GOCB include an employee volunteering to recycle office waste; suggesting process improvements that are eco-friendly; helping colleagues develop green practices -- none of which are formally expected by employees but are beneficial to the organization's environmental performance (Boiral & Paillé, 2012). As such, GOCB is similar to general OCB, but directed at environmental objectives (often referred to as "OCB for the environment" or OCBE). GOCB is valuable because it is an informal grassroots and self-motivated way for employees to contribute to an organization's sustainability efforts that can supplement an organization's formal environmental management systems.

Hooi, Liu, and Lin (2021) argued that GHRM is hypothesized to contribute to GOCB by influencing employees' attitudes, skills, and organizational culture. GHRM practices can enhance employees' ability (through green training), motivation (through incentives and performance evaluation tied to environmental goals), and opportunity (through empowerment and participation in sustainability initiatives) to perform green acts. When HRM consistently focuses on sustainability (e.g., hiring individuals who value the environment and reward eco-friendly initiatives), employees are more likely to internalize those values and perform extra-role behaviors to support the environment (Daily et al., 2009).

Although the idea that GHRM and GOCB are related was supported empirically, Hooi et al. (2022) demonstrated that there is a positive correlation between GHRM and GOCB at the workplace, and particularly, in organizations with robust green culture. Additionally, the findings from an international study by Pham et al. (2021) demonstrate that green training and empowering practices lead to an increase of eco-helping and

eco-initiative behaviors amongst employees, as well as a stronger sense of commitment towards environmental goals.

In addition, when employees perceive that their employer is serious about supporting their contributions toward sustainability via GHRM practices, then employees will feel obligated to respond in kind with positive behaviors (Social Exchange Theory). If employees believe that their organization truly cares about the environment and provides employees with the tools to contribute (through, for instance, resources to support green projects or recognition of volunteer efforts), then employees are likely to reciprocate with positive behaviors such as extra-role green behaviors (Chaudhary, 2020). Conversely, if green values are not included within HRM, then pro-environmental behaviors may occur randomly or be limited to those employees who are enthusiastic about the cause.

While theory suggests that GHRM has a relationship with GOCB, little has been done to explore the relationship between GHRM and GOCB, specifically in developing economies. As Liu et al. (2020) illustrate, individual characteristics (environmental awareness), organizational aspects (culture), and leadership styles all contribute to employees' propensity to engage in GOCB. To investigate whether increased green HRM practices are a viable method to foster voluntary sustainable behaviors among employees in an emerging economy.

GOCB and Sustainable Economic Performance

Also to the extent that employees' green OCBs play a role in environmental conservation, it is likely that they also play a role in organizational performance. Employees who put forth Green OCB may help their companies improve resource efficiency (for instance, in waste reduction and energy conservation), which in turn may lower costs. Also, in the case of Green OCB, employees may act as a catalyst for innovation and put forth ideas

related to greener process improvements that may, in turn, increase productivity or open up new business opportunities (for instance, in green products or technology). Green OCB also plays a role in a team-based work environment, which sees continuous improvement of sustainability issues, which in the end better the organization's performance as a whole. Also, when employees are into what may be termed as going above and beyond in terms of sustainability issues, the organization may see economic benefits as a secondary result (Wulandaru, Robani, Putri, 2024).

Many studies that we have seen in Business Strategy and the Environment report that green OCB is key to turning environmental strategies into performance indicators. We see in the recent research from the hospitality field that employees' OCB for the environment, which includes things like cost reduction and better customer service which in turn presents itself as a competitive edge for the organization (Zhao et al., 2023). Also, a study by Katz et al. (2022) did a meta-analysis which reports that it is a positive correlation between employee engagement in environmental practices and performance and that which they put forth is a element of a good sustainable business strategy.

Several studies published in Business Strategy and the Environment, have indicated that green OCB is critical to transforming environmental strategies into performance metrics, for example, recent research conducted in the hospitality industry found that employees' OCBE (Organizational Citizenship Behaviors for the Environment) resulted in cost reductions and enhanced customer service quality, resulting in the organization's competitive advantage (Zhao et al., 2023). A meta-analysis conducted by Katz et al. (2022) found that employee participation in environmentally friendly activities results in positive correlations with performance indicators and that creating such discretionary behaviors can be a part of a successful sustainable business strategy.

If GOCB does indeed contribute to organizational performance, it could serve as the missing link between GHRM and economic outcomes. GHRM might boost

financial performance indirectly by first encouraging employees to engage in green OCB, which in turn improves efficiency and reputation, ultimately reflected in the bottom line (Renwick et al., 2016). This logic yields a mediation hypothesis. Prior work provides some support: Renwick et al. (2016) conceptualized that GOCB can act as a mediating mechanism through which HRM practices impact environmental and financial performance. More recently, Khan and Muktar (2024) found that empowering employees (through GHRM) led to higher sustainable performance, and they identified employee-driven environmental initiatives as a critical channel for this effect.

Notably, the GHRM may have both a direct and an indirect (via GOCB) effect on performance. In other words, even as GOCB carries part of GHRM's influence to outcomes, GHRM might still influence performance through other pathways (e.g. direct efficiency gains from formal policies). We test for partial vs. full mediation in our analysis.

Finally, given mixed findings in prior literature, we also test the direct effect of GHRM on economic performance in our context. Companies that implement GHRM may reduce costs (through conservation and waste reduction), avoid regulatory penalties, improve their market image, and innovate in ways that drive financial gains (Barbier & Burgess, 2017; Jabbour et al., 2010). Hence this study is conceptualized in figure 1.

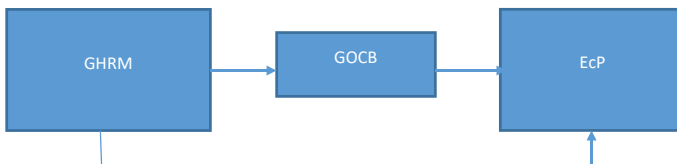


Figure 1. Conceptual Model

GHRM and Green Organizational Citizenship Behavior (GOCB)

The findings of the study conducted by Boira et al., (2015) reported a significant association between green motivation practices (green efficiency and green rewards) and Green Organizational Citizenship Behaviour (GOCB). In comparison, de Araujo (2014) showed a significant connection between the performance assessment and the GOCB. Evaluation programs are widely used for monitoring wages, recognizing the abilities and shortcomings of workers, and providing feedback on performance to increase organizational efficiency (Arshad et al., 2020).

Shaban (2019) highlighted that practicing green training and development is not costly for organizations; it is an investment for long-term survival. He further stated that organizations should be resilient in adopting green practices as it is an effort ultimately leading to the best environmental performance of the organization by reducing the negative impacts and improving its positive impacts. The training involves how to recycle and conserve waste (Krithika, et. al. 2019). Amongst the green practices are Green Printing, Green Manufacturing, and Teleconferencing, Virtual Interviews, Recycling, Online Training, Energy-Efficient Office Spaces, Green Payroll, and E-Filing. Shaban (2019) also opined that the training should include all activities such as workshops, master-classes, sessions, and experimental classes. It should also be able to equip employees as future managers and leaders. The training also allows the employee to be more engaged in problem-solving related to the environment (Zoogah, 2018).

Ghouri et al. (2020) stated that the most critical component of green performance management (GPM) for managers and staff is performance evaluation, which can have an impact on the process and efficacy of corresponding rewards and benefits. Clear environmental performance indicators are also essential for performance management systems. Evaluating the green results of managers underlines their position in sustainable

development, and may cause them to be more accountable for environmental management (EM) outcomes. It is important to establish green consequences and encourage managers to be responsible for the success of the environmental management system. Disbenefit is a derogatory measure to resolve the green success of participants who do not cooperate with the environmental management indicators or who do not align with the green objectives (Renwick et al., 2013). Appropriately using these negative measures can motivate workers to behave more effectively and to pursue green initiatives in their future jobs. Hence, we hypothesize as follows:

H1: Green Human Resource Management has a significant impact on Green Organizational Citizenship behavior

Green Organizational Citizenship Behaviour Mediates GHRM and Sustainable Performance

The results of the study conducted by Ragmoun and Alwehabie (2020) established that GHRM contributes to environmental success. OCBE has been influenced by GHRM practices, whereas Renwick et al. (2016) indicated that OCBE contributes to environmental efficiency. It has also been proposed as a method of translating GHRM practices for the improvement of environmental performance. It includes a range of ecological practices, including the disposal of occupational waste, recycling, carbon saving, and encouraging workers to pursue more environmentally responsible behaviors, which ultimately culminate in a better economic performance (Chun, 2009). Hence, we hypothesized as below:

H2: Green Organizational Citizenship Behaviour mediates the relationship between Green Human Resource Management and Organizational Economic Performance

GHRM and Economic Performance

According to Arulrajah and Opatha (2016), environmental requirements can also be used in recruiting messages, such as green labelling, pro-environmental image, green job requirements, integration of green awareness and abilities in the job description of all organizational job roles. The findings of the study conducted by Abiwu and Nunoo (2020) revealed that the incorporation of GHRM policies and practices may lead to the general development of the workforce by growing the demand for green employees. In addition, GHRM can promote discussion on the significance of adopting GHRM practices and policies because of their beneficial impacts on overall organizational greening (Aboramadan, 2020). By recruiting and maintaining potential employees with clear pro-environmental views, GHRM can also promote the enhancement of an environmentally friendly corporate reputation by strengthening the sustainable development strategy, which would lead even more to attract new staff with strong pro-environmental opinions (Abiwu & Nunoo, 2020). So what? Beyond indirect benefits through citizenship, organizations may realize immediate economic advantages from GHRM itself, motivating H3 on the direct effect.

Barbier and Burgess (2017) figured out that the interdependency of the goals of environmental, social and economic processes contributes to the achievement of the end goal of sustainable growth under the system approach. It concluded that many environmental management systems have been implemented by organizations to improve economic, organizational, social and ecological sustainability. In various areas that apply the green principle, HRM plays a significant role in implementing and maintaining a green culture among the organization's members. In general, GHRM is associated

with the environmental implications of managing people and addressing environmental issues relevant to work, aiming for better economic performance (Jabbour, Santos & Nagano, 2010; Opatha & Arulrajah, 2014). Hence, we hypothesized as follows:

H3: Green human resource management has a significant impact on the organizational economic performance

Research Methodology

This study is positivist in nature and adopts a deductive approach, as Crossan (2003) recommends this approach where the research has a set of hypotheses to be confirmed or rejected. Further, this is based on the Mono Method Quantitative (MMQ), and a cross-sectional data collection method has been used as the data required from the research participants is primary and can be collected at once from all of the research participants of this study. The targeted population of the present study is the HR personnel serving in 38 multinational firms operating in Pakistan. One of the basic conditions for the inclusion of such multinational firms is their green organizational management practices. By applying purposive sampling, the sample size of this research from 38 multinational firms, which have green organizational management practices, is 150. The gathered data have been compiled and analyzed statistically by employing the appropriate statistical tests in both ways; descriptive statistics and inferential analysis to test the formulation of hypothesized statements. Based on the objectives and hypothesis of this study, regression and correlation statistics are run to see the impact of GHRM practices on Organizational citizenship behavior and economic performance of organizations. Structural equation modeling through Smart PLS 4.0 is implied for data analysis.

Results

Table 1: Descriptive Statistics

	Mean	St.Dev	Skewness	Kurtosis	Cronbach Alpha
ECP	0.252	0.119	-1.951	2.987	0.732
GHRM	0.417	0.097	1.389	1.982	0.687
COCB	0.559	0.106	1.566	2.319	0.672

The table 1 provides statistical measures for three constructs: Environmental Corporate Practices (ECP), Green Human Resource Management (GHRM), and Corporate Citizenship Behavior (COCB). The mean values show the average scores, with COCB having the highest mean (0.559), followed by GHRM (0.417) and ECP (0.252). The standard deviations indicate the variability around these means, with ECP having the highest variability (0.119) and GHRM the lowest (0.097). Skewness values show the asymmetry of the distribution of each construct, while kurtosis values provide insights into the peakness of the distributions. . Lastly, Cronbach's Alpha values assess the internal consistency reliability of the scales used for these constructs. All values are above the acceptable threshold of 0.6, with ECP having the highest reliability (0.732), followed by GHRM (0.687), and COCB (0.672), indicating that the scales used are sufficiently reliable for the constructs measured.

Table 2: Convergent Validity

	Mean	St.Dev	Composite Reliability	Avg. Var
ECP	0.252	0.119	0.768	0.425
GHRM	0.417	0.097	0.749	0.488
CoCB	0.559	0.106	0.722	0.351

Table 2 shows the reliabilities and descriptives of three constructs: Green Human Resource Management (GHRM); Environmental Corporate Practices (ECP); and Corporate Citizenship Behaviour (CoCB). The mean scores indicate the averages for each construct; CoCB had the largest mean (Mean = 0.559), followed by GHRM (Mean = 0.417) and ECP (Mean = 0.252). Thus, based on the average ratings given by the participants, the

participants rated CoCB as being the most important and ECP the least important. Standard deviation scores show how much variability there was in participants' responses from the mean score. Standard deviation scores indicated the greatest variability in ECP (SD = 0.119) and the least variability in GHRM (SD = 0.097). Thus, participants tended to be more consistent in their response to items in the GHRM scale than to those in the ECP scale. Composite reliability scores assess the degree of internal consistency among the individual item scales used to form a particular construct.

ECP had the highest composite reliability (CR = 0.768) and CoCB had the smallest composite reliability (CR = 0.722) with GHRM falling between them (CR = 0.749). All of these values are greater than 0.70, which is the minimum required value to demonstrate acceptable internal consistency reliability. Average Variance Extracted (AVE) values are indicators of the proportion of total variance that is attributable to the common factor among the indicators of a construct. Based on this criterion, the highest AVE values of the three constructs occurred for GHRM (AVE = .488), followed by ECP (AVE = .425), and then CoCB (AVE = .351). Based on the APA standards, these results suggest that the measurement model for each of the three constructs demonstrated acceptable levels of both reliability and validity.

Table 3: Discriminant Validity Heterotrait-Monotrait (HTMT)

Discriminant Validity HTMT		
ECP		
GHRM	0.587	
GOCB	0.825	0.572

Table 3 presents the Heterotrait-Monotrait (HTMT) ratios of correlation for the three constructs: Environmental Corporate Practices (ECP); Green Human Resource Management (GHRM); and Corporate Citizenship Behavior (CoCB). The results indicate that the measures for these three constructs have

distinctiveness to them; they capture different dimensions and do not overlap or contain redundant information. There is a clearly established distinction between ECP and GHRM at an HTMT ratio of 0.587 since it is below the widely used threshold of 0.85. While the HTMT ratio for ECP and CoCB was 0.825, which is just above the threshold, there is still evidence that this pair of constructs is also reasonably distinct from one another. Likewise, the HTMT ratio for GHRM and CoCB at 0.572, again establishes a reasonable amount of distinction between the constructs of GHRM and CoCB. In total, the HTMT ratios presented in Table 3 provide support for the notion that the constructs of ECP, GHRM and CoCB have sufficient distinctiveness to justify their use as separate constructs, as all ratios are less than the threshold of 0.85, thus satisfying the thresholds proposed by Henseler, Ringle and Sarstedt (2015). Therefore, each construct captures a distinct aspect of the broader theoretical framework examined.

Table 4: Discriminant Validity (Fornell-Larcker Criterion)

Discriminant Validity Fornell-Larcker Criterion			
ECP	0.652		
GHRM	0.485	0.698	
GOCB	0.664	0.417	0.593

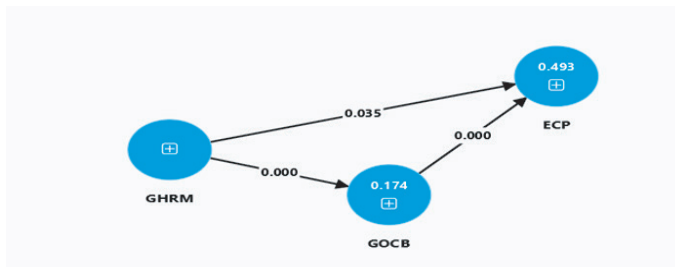
The information provided in the Table 4 pertains to the Fornell-Larcker criterion values that are utilized for evaluating discriminant validity among three constructs: Environmental Corporate Practices (ECP), Green Human Resource Management (GHRM), and Corporate Citizenship Behavior (CoCB). To confirm discriminant validity, it is necessary for the square root of the average variance extracted (AVE) for each construct to be higher than its highest correlation with any other construct. The diagonal values in the table represent the square roots of the AVE for each construct: ECP (0.652), GHRM (0.698), and CoCB (0.593). These values are then compared against the off-diagonal correlations between

constructs. The correlation between ECP and GHRM is 0.485, between ECP and CoCB is 0.664, and between GHRM and CoCB is 0.417.

According to the Fornell-Larcker criterion, discriminant validity is established when the AVE square root (diagonal values) for each construct surpasses its correlations with other constructs (off-diagonal values). Specifically, for ECP, the AVE square root (0.652) is higher than its correlations with GHRM (0.485) and CoCB (0.664). In the case of GHRM, its AVE square root (0.698) exceeds its correlation with CoCB (0.417). However, the AVE square root for CoCB (0.593) is marginally lower than its correlation with ECP (0.664), suggesting a potential issue with the discriminant validity between these two constructs

The Fornell-Larcker criterion reveals that ECP and GHRM demonstrate sufficient discriminant validity, while there may be some overlap between ECP and CoCB, which warrants further examination. This outcome implies that, although the constructs are generally distinct, there is a necessity for enhancing the measurement of ECP and CoCB to fully establish their discriminant validity.

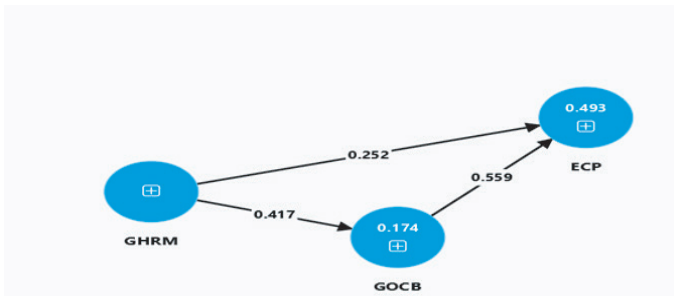
Figure 2: Measurement Model



The relationship among the concepts of Green Human Resource Management (GHRM) & Corporate Citizenship Behavior (CoCB) and Environmental Corporate Practices (ECP). The path coefficients that are shown in the arrows represent the magnitude and significance of each relationship as well as the direction of each

relationship. There is a very strong and statistically significant positive relationship between GHRM and ECP. This is evidenced by a path coefficient of .493, ($p = .000$) between GHRM and ECP. The substantial positive effect of Green HRM practices for implementing ECP within an organization are clearly evident here. A positive but weakly statistically significant relationship was found between GHRM and CoCB. This relationship is represented by a path coefficient of .174 ($p = .000$) between GHRM and CoCB. The relationship between GHRM and CoCB is weak when compared to the relationship between GHRM and ECP; however, it illustrates that GHRM contributes positively to the development of Corporate Citizenship Behavior. The path coefficient from CoCB to ECP is .035 ($p = .000$). It is not statistically significant and therefore indicates no direct positive or negative influence of CoCB on ECP. In summary, based on the results of the measurement model, Green Human Resource Management appears to be a key driver for developing both Environmental Corporate Practices and Corporate Citizenship Behavior. In addition, the measurement model supports that there is no direct influence of Corporate Citizenship Behavior on Environmental Corporate Practices and, consequently, suggests that other intervening variables could exist in this relationship. These findings support the importance of GHRM as a key factor to develop responsible and sustainable corporate behavior.

Figure 3: Structural Model



Smart PLS Structural Model: Relationships Between Green Human Resource Management (GHRM) and Corporate Citizenship Behavior (CoCB) and

Environmental Corporate Practices (ECP) Smart PLS Structural Model provides an illustration of how Corporate Citizenship Behavior (CoCB) and Environmental Corporate Practices (ECP) are related to each other through Green Human Resource Management (GHRM). Smart PLS Structural Model uses Path Coefficients to represent the strength and significance of those relationships. Path Coefficient from GHRM to ECP = .493; Positive and Strong Relationship; Organizations that have high levels of Green Human Resource Management Practices are more likely to exhibit higher levels of Environmental Corporate Practices. Path Coefficient from GHRM to CoCB = .174; Positive but Weak Relationship; While GHRM has a positive influence on Corporate Citizenship Behavior its influence is much less than it has on Environmental Practices. Path Coefficient from CoCB to ECP = .559; Significant Positive Relationship; Indicates that Corporate Citizenship Behaviors have a very significant impact on the adoption and implementation of Environmental Corporate Practices by organizations. Also, the Smart PLS Structural Model demonstrates a Direct Path from GHRM to CoCB with a Coefficient of .417. Demonstrates a Strong Positive Relationship between Green Human Resource Management and Corporate Citizenship Behaviors. The Smart PLS Structural Model clearly indicates that Green Human Resource Management has a Significant Influence on both Corporate Citizenship Behavior and Environmental Corporate Practices. Additionally, Corporate Citizenship Behavior has a Significant Influence on Environmental Corporate Practices. Together, these results clearly demonstrate the Important Role that Green Human Resource Management can have in Encouraging Responsible Corporate Behaviors and Environmental Sustainability within Organizations.

Table 5: Results of the Relationships

	Original sample	Sample Mean	St.Dev	T-Statistics	P Values
GHRM → ECP	0.252	0.258	0.119	2.114	0.035
GHRM → GOCB	0.417	0.451	0.097	5.285	0.000
GHRM → GOCB → ECP	0.233	0.257	0.068	3.046	0.001

The data shown in the Table illustrates the findings from a Structural Equation Modeling (SEM) Analysis, illustrating the relationships between Green Human Resource Management (GHRM), Corporate Citizenship Behavior (CoCB), and Environmental Corporate Practices (ECP). The Table presents sample estimates, sample means, sample standard deviations, T-statistics, and p-values for all paths in the Model.

The path representing the relationship between GHRM and ECP was found to have a sample estimate = 0.252, a sample mean = 0.258, and a sample standard deviation = 0.119. Additionally, the T-statistic = 2.114 and the p-value = 0.035, which indicates that the relationship between these two variables is statistically significant at the .05 alpha level. Therefore, GHRM appears to have a positive and significant effect on ECP; i.e., organizations employing effective GHRM practices tend to adopt greater environmental corporate practices.

The path between GHRM and CoCB had a sample estimate = 0.417, a sample mean = 0.451, and a sample standard deviation = 0.097. Moreover, the T-statistic for this path was found to be 5.285 and the p-value was found to be 0.000, which suggests that this relationship is very strong. Thus, GHRM was found to have a significant effect on CoCB, implying that organizations implementing green HR practices will be more likely to exhibit behaviors that reflect their commitment to corporate citizenship.

The indirect effect of GHRM on ECP through CoCB (i.e., GHRM → CoCB → ECP) had a sample estimate = 0.233, a sample mean = 0.257, and a sample standard deviation = 0.068. The T-statistic for the indirect path was 3.046 and the p-value was 0.001, indicating that the mediation effect of CoCB on the relationship between GHRM and ECP is statistically significant. Therefore, it can be inferred that CoCB plays a partial mediating role in the

relationship between GHRM and ECP, indicating that a portion of the effect of GHRM on ECP is attributable to the effect of GHRM on CoCB.

Therefore, the overall conclusions drawn from this SEM analysis are that there is a direct positive effect of GHRM on both CoCB and ECP. Furthermore, the results suggest that the effects of GHRM on ECP are partially mediated by CoCB. Overall, the findings emphasize the critical role of green HRM practices in promoting socially responsible organizational behavior and environmentally sustainable organizational practices, and the potential mediating role of corporate citizenship in facilitating enhanced environmental practices among organizations.

Discussion

Theoretical Implications

The empirical evidence provided in this study offers insights into how Green Human Resource Management (GHRM) practices generate sustainable financial returns and through which mechanisms—Green Organizational Citizenship Behavior (GOCB)—this occurs. We establish that GHRM is a powerful determinant of GOCB and subsequently organizational performance. The current study represents a significant addition to GHRM literature as it addresses the ‘black box’ of the relationship between GHRM and firm-level outcomes. Ren et al. (2021) and Khan & Muktar (2024) called for additional GHRM models that incorporate employee behaviors as mediation variables. As such, we demonstrate that a large proportion of the GHRM influence on performance can be attributed to employees' discretionary/extra-role behaviors. According to the Ability–Motivation–Opportunity framework, GHRM enhances employees' ability and motivation for environmental engagement, and this is exhibited as GOCB and ultimately leads to enhanced organizational performance, as suggested by Hooi et al. (2022).

Social Exchange Theory is reinforced by our study findings regarding the reciprocal nature of employee behaviors towards their employer, given they perceive an

organization 'going green' in terms of managing human resources. Employees will reciprocate positive discretionary efforts if they perceive an organization's support for environmental issues. The organization's "green" policies send signals of support to the employees who perceive them and then feel obligated to assist the organization in achieving its environmental objectives. Employees' discretionary behaviors, including conserving energy, reducing waste, and implementing innovative eco-efficient practices, create non-monetary value and lead to increased operational efficiencies, potentially generating financial gains. The mutual commitment to environmental values, per social exchange theory, increases the strength of the employee-employer relationship and therefore positively affects employee citizenship behaviors and performance (Blau, 1964; Islam et al., 2021). Therefore, this study expands previous studies that have typically only explored the direct effects of GHRM on performance, providing empirical evidence of the exchange dynamic within the green HR context.

Moreover, the establishment of a direct GHRM → performance link (H3) supports the increasing body of research suggesting that sustainability can be a source of financial returns. Our results support the growing consensus that "doing good" does not preclude "doing well." Our data from developing economy firms, many of whom may be concerned about the cost of adopting green initiatives, indicate that investment in GHRM generates financial returns. Our study provides empirical support for the resource-based view position that GHRM is a source of competitive advantage due to its development of a unique human capital pool (green-skilled employees with engagement) that is valuable, rare, difficult to imitate, and leads to superior organizational performance (Barney, 1991; Pham et al., 2019). Furthermore, our study supports the concept of Sustainable HRM, which posits that HRM systems that focus on sustainability are key contributors to long-term organizational viability (Ehnert et al., 2014). Thus, our study provides empirical support for sustainable HRM by demonstrating a positive relationship with performance

in the short-to-medium term.

Our study provides specific enrichment to the literature on emerging economies. The majority of existing research on GHRM and associated outcomes has been conducted in developed countries or China. Our study demonstrates that the theoretical relationships exist in South Asia cultural and business environments. Importantly, our study was able to demonstrate that firms in Pakistan, a country with low regulatory pressures for environmental compliance compared to those of Western countries, were able to reap performance benefits from proactive GHRM. Thus, while regulatory pressures for environmental compliance may not be present in emerging economies, our study shows that organizations with internal strategic choices to proactively implement GHRM can achieve performance benefits — a valuable lesson for researchers and practitioners in emerging economies. Furthermore, our study suggests that the motivations for GHRM in emerging economies may be influenced more by potential efficiency gains and international stakeholder expectations (e.g., multinational companies requiring adherence to global green standards) rather than domestic regulation. Overall, our study supports the generalizability of GHRM theory and answers calls for more research in a variety of economic settings (Yusliza et al., 2020; Aftab et al., 2023).

Another theoretical contribution of our study lies in connecting the micro- and macro-domains. Our study combined organizational behavior (OCB) with strategic HRM and performance. Thus, we addressed the call for consideration of multilevel influences in sustainable HRM research. We demonstrated that concepts typically studied at the individual level (OCB) can significantly impact organizational-level outcomes and should therefore be incorporated into strategic models. Our study provides a more complete understanding of how green initiatives penetrate an organization by combining OB and SHRM perspectives.

Lastly, our study provides insights into the content of GOCB in organizations. The significant influence of GOCB on performance highlights the significance of the

"hidden" actions of employees can contribute to tangible organizational improvements. Our study provides the basis for further theoretical work on GOCB — for example, investigating the dimensionality of GOCB (helping, initiative, civic virtue for the environment) and the differential effects of each dimension on outcomes.

This article has raised interesting questions about the potential boundary conditions of GOCB: Under what type(s) of organizational climates/leadership styles will GOCB be optimized? Although our study was focused on mediation rather than moderation, the authors would encourage future research to explore how leadership (i.e., green transformational leadership) and/or organizational culture influence the degree to which the GHRM → GOCB → performance chain exists.

Practical Implications

The findings of this research have important implications for managers and practitioners in all types of organizations. The most obvious implication is that while there are many reasons to invest in GHRM (for example, environmental responsibility), one reason is that it also provides businesses with important competitive advantages. As such, managers in HR and Sustainability roles can use the findings of this research to demonstrate the practical value of "going green" and to advocate for the implementation of more robust GHRM practices (such as recruiting employees who are passionate about the environment; training employees in how to operate in a more sustainable manner; and recognizing and rewarding employee's contributions to sustainability) that will improve their organization's ability to compete financially and in the marketplace.

Further, the findings of this research indicate that when employees perceive that their organization is committed to operating in a more sustainable manner, and that they are empowered to participate in those activities, they are more likely to go the extra mile to assist the organization

in achieving greater operational efficiency and developing innovative solutions to sustainability problems. These two outcomes provide significant competitive advantages for organizations and can result in improved profitability and competitive position.

Therefore, encouraging employees to engage in Green OCB is a critical component of any sustainability initiative. Organizations cannot require employees to exhibit voluntary behaviors, however, they can establish an organizational climate that supports and fosters such behaviors.

Recommendations

To achieve this objective, the authors recommend that organizations implement the following:

(1) Embed environmental values within the organizational culture. Establishing environmental values within an organization's culture requires that the organization's top management communicate their commitment to environmental sustainability and lead by example. Additionally, the organization's mission statement and daily routines should incorporate environmental sustainability as a core aspect of the organization's identity. Employees who believe that environmental sustainability is integral to "the way we do business around here," are more likely to adopt spontaneous green behaviors.

(2) Empower and involve employees in sustainability initiatives. Provide employees with opportunities to contribute to and act on their ideas related to sustainability (e.g., green suggestion programs or cross-functional green teams). When employees are given the autonomy to make decisions and act independently in regards to sustainability issues, Green OCB is likely to flourish. Consistent with other research (Khan & Muktar, 2024; Zhao et al., 2023), our study indicates that empowering employees and involving them in sustainability initiatives is critical to stimulating OCBE.

(3) Recognize and reward extra-role green behaviors. While OCB by definition is not expected to receive formal rewards, management acknowledgement (e.g., public recognition in company communications, green

champion awards, etc.) can reinforce and encourage employees' engagement in GOCB. Some organizations have developed programs to recognize and reward employees for their participation in green initiatives (e.g., Green Employee of the Month programs, bonuses based on team environmental performance) (Odhiambo et al., 2023). Our study's results as well as others' (for instance Odhiambo et al., 2023) report that which which puts in place recognition and reward programs can in fact increase employees' engagement in GOCB.

From a human resources point of view, we should see to it that we have in place training programs for employees which address technical skills related to running environmental programs as well as the value of what they and we all do in terms of our sustainability goals. We put into our employees the what they need to know and be able to do in terms of recycling, conservation of energy, and improving processes which in turn reduces environmental impact which in turn builds up their confidence in their role at GOCB (Shaban, 2019).

Performance in which we include sustainability related goals or KPIs is that employees play a role in sustainability within the organization and we have that employees do in fact respond to such systems.

From a business point of view which is the perspective this study takes we see that business leaders and in turn strategy makers should look at GHRM as a investment in long term performance. Also in emerging markets which may have limited resources our which are what organizations have at their disposal there is still the fact that GHRM can bring about efficiencies and improvements which in turn will see to it that the costs related to such programs are offset. Also we note that multi national firms which play in the emerging markets are growing to be very much under the global partners' and also customers' microscopes as far as their sustainability report goes; hence having solid GHRM in place can greatly improve a company's image and open up new business opportunities (for instance becoming a go to supplier for green conscious clients). GHRM is a pillar of which a company may build a sustainable business strategy that at the same time benefits the

environment and the economy.

Government in the past has had a role in which they supported this study's results. While we look at what large companies are doing we also see that which which of our research is applied in other industries and across the world may see great macroeconomic results for example green industries and we may see economic growth from increased efficiency. Also government can play a role in seeing that which of our research is put into practice through the creation of awards, guidelines and also including GHRM into corporate sustainability indexes.

Conclusion

In this study we present empirical proof which supports that GHRM improves organizational economic performance and we report that which also by way of improving GOCB among staff. Also we looked at data from an emerging market which shows that companies which have put environmental sustainability into their HR strategies see better financial results and that we also found that employees' green behaviors play a key role as a mediator in the relationship between GHRM and financial performance.

These results present to us that we have a greater grasp of the theory which underpins sustainable performance we see how what may be at a very intangible level in terms of employee action which is a result of green human resource practices may in fact produce tangible economic results.

For the business community which is what we look at we have research which reports that going green in the HR function is a smart business play. Instead of seeing environmental programs as a cost or a public relations ploy, companies should see the performance benefits of a green and engaged work force. By creating a culture which allows for the growth of what we may term green citizenship we see that firms not only play a role in global sustainability but also in driving innovation, efficiency, and competitiveness from within. In an age where sustainability is a key to business success our study puts forth the case of the HRD's role as a catalyst for the alignment of people, planet and profit.

References

Abiwu, K., & Nunoo, F. K. (2020). Incorporation of Green HRM policies and practices: Effects on workforce development and corporate reputation. Journal of Sustainable Management Studies, 12(3), 145-162.

Aboramadan, M. (2020). Green HRM practices and their impact on organizational greening [Doctoral dissertation or article]. Institution or Journal.

Aftab, J., Abid, N., & Cucari, N. (2023). Green human resource management and sustainable performance: Evidence from a developing country. Sustainability, 15(2), 1225. <https://doi.org/10.3390/su15021225>

Anwar, N., Mahmood, N. H. N., Yusliza, M. Y., Ramayah, T., Faezah, J. N., & Khalid, W. (2020). Green human resource management for organisational citizenship behaviour towards the environment and environmental performance on a university campus. Journal of Cleaner Production, 256, 120401. <https://doi.org/10.1016/j.jclepro.2020.120401>

Barbier, E. B., & Burgess, J. C. (2017). The sustainable development goals and the systems approach to sustainability. Economics: The Open-Access, Open-Assessment E-Journal, 11(2017-28), 1-23. <https://doi.org/10.5018/economics-ejournal.ja.2017-28>

Blau, P. M. (1964). Exchange and power in social life. Wiley

Boira, S., Alarcón, V., & Escartín, J. (2015). Green motivation practices and organizational citizenship behaviour for the environment. Management Decision, 53(5), 1171-1185. <https://doi.org/10.1108/MD-01-2014-0004>

Boiral, O., & Paillé, P. (2012). Organizational citizenship behaviour for the environment: Measurement and validation. Journal of Business Ethics, 109(4), 431-445. <https://doi.org/10.1007/s10551-011-1138-9>

Chaudhary, R. (2020). *Green human resource management and employee green behavior: An empirical analysis. Corporate Social Responsibility and Environmental Management*, 27(2), 630–641. <https://doi.org/10.1002/csr.1827>

Chun, J. S. (2009). *Organizational citizenship behaviour and environmental efficiency: Linking green HRM and economic performance. Journal of Business Ethics*, 88(2), 227-240.

Daily, B. F., Bishop, J. W., & Govindarajulu, N. (2009). *A conceptual model for organizational citizenship behavior directed toward the environment. Business & Society*, 48(2), 243–256. <https://doi.org/10.1177/0007650308315439>

Ghouri, A. M., Mani, V., Khan, M. R., & Srivastava, A. P. (2020). *Enhancing business performance through green human resource management practices: An empirical evidence from Malaysian manufacturing industry. International Journal of Productivity and Performance Management*, 69(8), 1585–1607. <https://doi.org/10.1108/IJPPM-03-2019-0124>

Ghouri, A. M., Mani, V., Khan, M. R., & Srivastava, A. P. (2020). *Enhancing business performance through green human resource management practices: Empirical evidence from Malaysian manufacturing industry. International Journal of Productivity and Performance Management*, 69(8), 1585-1607. <https://doi.org/10.1108/IJPPM-03-2019-0124>

Haddock-Millar, J., Sanyal, C., & Müller-Camen, M. (2016). *Green human resource management: A comparative qualitative case study of a United States multinational corporation. International Journal of Human Resource Management*, 27(2), 192–211. <https://doi.org/10.1080/09585192.2015.1052087>

Hameed, Z., Khan, I. U., Islam, T., Sheikh, Z., & Naeem, R. M. (2020). *Do green HRM practices influence*

employees' environmental performance? International Journal of Manpower, 41(7), 1061–1079.
<https://doi.org/10.1108/IJM-08-2019-0407>

Hameed, Z., Khan, I. U., Islam, T., Sheikh, Z., & Naeem, R. M. (2020). Do green HRM practices influence employees' environmental performance? *International Journal of Manpower*, 41(7), 1061–1079.

Hooi, L. W., Lin, W., & Wang, X. (2022). Linking green HRM practices to employees' green behavior: The role of green work engagement and green organizational culture. *Employee Relations*, 44(4), 889–908.
<https://doi.org/10.1108/ER-04-2021-0163>

Hooi, L. W., Lin, W., & Wang, X. (2022). Linking green HRM practices to employees' green behavior: The role of green work engagement and green organizational culture. *Employee Relations*, 44(4), 889–908.

Hooi, L. W., Liu, H., & Lin, W. (2021). Green human resource management and organizational citizenship behavior for the environment: The mediating roles of green psychological climate and work engagement. *Journal of Cleaner Production*, 310, 127377.
<https://doi.org/10.1016/j.jclepro.2021.127377>

Jabbour, C. J. C., Santos, F. C. A., & Nagano, M. S. (2010). Contributions of HRM throughout the stages of environmental management: Methodological triangulation applied to companies in Brazil. *International Journal of Human Resource Management*, 21(7), 1049–1089.
<https://doi.org/10.1080/09585191003783512>

Jabbour, C. J. C., Santos, F. C. A., & Nagano, M. S. (2010). Contributions of HRM throughout the stages of environmental management: Methodological triangulation applied to companies in Brazil. *International Journal of Human Resource Management*, 21(7), 1049–1089.
<https://doi.org/10.1080/09585191003783512>

Jackson, S. E., Ren, S., & Jabbour, C. J. C. (2022). Green human resource management and the pursuit of environmentally sustainable business organizations: A review. *Business Strategy and the Environment*, 31(3), 1347–1362. <https://doi.org/10.1002/bse.2978>

Katz, D., Li, Y., & Wang, T. (2022). Meta-analysis of employee green behaviors and organizational performance. *Journal of Business Ethics*, 179(3), 645-662.

Khan, S., & Muktar, S. S. (2024). Empowering employees through green HRM: The role of environmental initiatives in sustainable performance. *Sustainability*, 16(2), 1190.

Khan, S., & Muktar, S. S. (2024). Empowering employees through green HRM: The role of environmental initiatives in sustainable performance. *Sustainability*, 16(2), 1190.

Liu, X., Wang, Y., & Chen, Z. (2020). Individual and organizational factors influencing green organizational citizenship behavior in developing economies. *Environmental Management Review*, 34(4), 523-540.

Longoni, A., Luzzini, D., & Guerzi, M. (2018). Deploying environmental management across functions: The relationship between green human resource management and green supply chain management. *Journal of Business Ethics*, 151(4), 1081–1095. <https://doi.org/10.1007/s10551-016-3228-1>

Lorek, S. (2019). Business informatics tools for sustainability management: Monitoring and controlling resource efficiency. *Management*, 23(2), 45–62.

Masri, H. A., & Jaaron, A. A. M. (2017). Assessing green human resources management practices in Palestinian manufacturing context: An empirical study. *Journal of Cleaner Production*, 143, 474–489. <https://doi.org/10.1016/j.jclepro.2016.12.087>

Masri, H. A., & Jaaron, A. A. M. (2017). *Assessing green human resources management practices in Palestinian manufacturing context: An empirical study*. *Journal of Cleaner Production*, 143, 474-489. <https://doi.org/10.1016/j.jclepro.2016.12.087>

National Research University – Higher School of Economics. (2025). *Business informatics: The role of information systems in sustainable HRM*. HSE Press.

O'Donohue, W., & Torugsa, N. A. (2016). *The moderating effect of 'Green' HRM on the association between proactive environmental management and financial performance in small firms*. *International Journal of Human Resource Management*, 27(2), 239 – 261. <https://doi.org/10.1080/09585192.2015.1063078>

Opatha, H. H. D. N. P., & Arulrajah, A. A. (2014). *Green human resource management: Simplified general reflections*. *International Business Research*, 7(8), 101–112. <https://doi.org/10.5539/ibr.v7n8p101>

Pham, N. T., Tučková, Z., & Jabbour, C. J. C. (2021). *Greening the hospitality industry: How do green human resource management practices influence organizational citizenship behavior for the environment?* *Tourism Management*, 84, 104161. <https://doi.org/10.1016/j.tourman.2020.104161>

Pham, N. T., Tučková, Z., & Phan, Q. P. T. (2019). *Greening human resource management and employee commitment toward the environment: An interaction model*. *Journal of Business Economics and Management*, 20(3), 446–465. <https://doi.org/10.3846/jbem.2019.9659>

Ragmoun, W., & Alwehabie, A. (2020). *Green HRM, environmental success and OCBE in emerging economies*. *Journal of Environmental Sustainability*, 8(1), 55-70.

Ren, S., & Jackson, S. E. (2020). *HRM in business organizations: The pursuit of sustainability*. *Current Opinion in Environmental Sustainability*, 45, 1–5.

<https://doi.org/10.1016/j.cosust.2020.09.002>

Ren, S., Jackson, S. E., & Colleagues. (2021). Title of the specific article or chapter by Ren et al. (Note: full reference details need verification—journal, volume, pages)

Renwick, D. W. S., Jabbour, C. J. C., Müller-Camen, M., Redman, T., & Wilkinson, A. (2016). Contemporary developments in Green (environmental) HRM scholarship. International Journal of Human Resource Management, 27(2), 114-128.

Renwick, D. W. S., Redman, T., & Maguire, S. (2013). Green human resource management: A review and research agenda. International Journal of Management Reviews, 15(1), 1–14. <https://doi.org/10.1111/j.1468-2370.2011.00328.x>

Renwick, D. W. S., Redman, T., & Maguire, S. (2013). Green human resource management: A review and research agenda. International Journal of Management Reviews, 15(1), 1-14.

Sathyapriya, J., Kanimozhi, R., & Adhilakshmi, V. (2013). Green HRM—Delivering high performance HR systems. International Journal of Marketing and Technology, 3(6), 227–234.

Shaban, O. S. (2019). Green training and development: Long-term investment in organizational environmental performance. Journal of Environmental Training & Development, 5(2), 89-105.

Shen, J., Dumont, J., & Deng, X. (2018). Employees' perceptions of green HRM and non-green employee work outcomes: The social identity and stakeholder perspectives. Group & Organization Management, 43(4), 594–622. <https://doi.org/10.1177/1059601116664610>

Tang, G., Chen, Y., Jiang, Y., Paillé, P., & Jia, J. (2018). Green human resource management practices: Scale

development and validity. Asia Pacific Journal of Human Resources, 56(1), 31–55.
<https://doi.org/10.1111/1744-7941.12147>

Tang, G., Chen, Y., Jiang, Y., Paillé, P., & Jia, J. (2018). Green human resource management practices: Scale development and validity. Asia Pacific Journal of Human Resources, 56(1), 31–55.
<https://doi.org/10.1111/1744-7941.12147>

Wagner, M. (2013). ‘Green’ human resource benefits: Do they matter as determinants of environmental management system implementation? Journal of Business Ethics, 114(3), 443–456.
<https://doi.org/10.1007/s10551-012-1356-9>

Walentek, D. (2020). Information and communication technologies and environmental sustainability: Telecommuting as a green HR practice. Sustainability, 12(21), 9139. <https://doi.org/10.3390/su12219139>

Walentek, D. (2021). Managing remote employees: Challenges for green HRM and sustainable performance. Journal of Cleaner Production, 316, 128248.
<https://doi.org/10.1016/j.jclepro.2021.128248>

World Health Organization. (2018). 9 out of 10 people worldwide breathe polluted air, but more countries are taking action.
<https://www.who.int/news/item/02-05-2018-9-out-of-10-people-worldwide-breathe-polluted-air>

Wulandaru, P., Robani, A., & Putri, N. A. (2024). Green organizational citizenship behavior and sustainable organizational performance: Evidence from Indonesian SMEs. Business Strategy and the Environment, 33(1), 77–91.

Wulandaru, P., Robani, A., & Putri, N. A. (2024). Green organizational citizenship behavior and sustainable organizational performance: Evidence from Indonesian SMEs. Business Strategy and the Environment, 33(1), 77–91.

development and validity. Asia Pacific Journal of Human Resources, 56(1), 31–55.
<https://doi.org/10.1111/1744-7941.12147>

Tang, G., Chen, Y., Jiang, Y., Paillé, P., & Jia, J. (2018). *Green human resource management practices: Scale development and validity. Asia Pacific Journal of Human Resources, 56(1), 31–55.*
<https://doi.org/10.1111/1744-7941.12147>

Wagner, M. (2013). 'Green' human resource benefits: Do they matter as determinants of environmental management system implementation? *Journal of Business Ethics, 114(3), 443–456.*
<https://doi.org/10.1007/s10551-012-1356-9>

Walentek, D. (2020). *Information and communication technologies and environmental sustainability: Telecommuting as a green HR practice. Sustainability, 12(21), 9139.* <https://doi.org/10.3390/su12219139>

Walentek, D. (2021). *Managing remote employees: Challenges for green HRM and sustainable performance. Journal of Cleaner Production, 316, 128248.*
<https://doi.org/10.1016/j.jclepro.2021.128248>

World Health Organization. (2018). *9 out of 10 people worldwide breathe polluted air, but more countries are taking action.*
<https://www.who.int/news/item/02-05-2018-9-out-of-10-people-worldwide-breathe-polluted-air>

Wulandaru, P., Robani, A., & Putri, N. A. (2024). *Green organizational citizenship behavior and sustainable organizational performance: Evidence from Indonesian SMEs. Business Strategy and the Environment, 33(1), 77–91.*

Wulandaru, P., Robani, A., & Putri, N. A. (2024). *Green organizational citizenship behavior and sustainable organizational performance: Evidence from Indonesian SMEs. Business Strategy and the Environment, 33(1), 77–91.*



Greenwich University

Journal of Business Strategies

About the Journal

Journal of Business Strategies (JBS) is an international peer-reviewed, academic research journal published by the Faculty of Management Sciences, Greenwich University Karachi. *JBS* is published bi-annually in December and June every year. The journal publishes academic research articles concerning business needs, trends and future perspectives. *JBS* disseminates innovative research comprising of vast array of fields and sub-fields related to business studies so that the academia and industry can benefit from the emerging opportunities stimulated by technological, societal and global change. Researchers from diversified subject areas related to business studies, including but not limited to, Business Marketing, Management, Finance, Accounting, Economics, Corporate Governance & Management, Econometrics, Branding and Advertising, Micro & Macro Economic issues and other related disciplines are invited to publish their contributions.

Scope & Mission

Journal of Business Strategies (JBS) heralds the research discourse among academic researchers, business executives and other intellects about advances in Business Management practices, specifically those stimulated by Information Technology and Innovation, which intend to transform the societal and economic structure. *JBS* provides an academic platform for business professionals and research scholars to contribute their original, unpublished and novel researches in the diverse business fields.

Plagiarism Policy

Journal of Business Strategies (JBS) has no tolerance policy against plagiarism. All submitted manuscripts are scanned for similarity Index (SI) through the plagiarism detection software. If the similarity index of the text is more than the acceptable threshold i.e. 18% (including references, bibliography), the paper is rejected or returned back to the authors for modification. Please refer to the Ethical Guidelines for authors for the journal for further details regarding plagiarism.

Author Guidelines

JBS accepts and prefers manuscript on the following basic criteria:

- Novelty
- Innovativeness
- Originality
- Robust/Advanced Methodology

Before Submission:

- Before Submission of an article, author(s) should carefully read the Publication Ethics, Open Access policy and Plagiarism Policy of the Journal.
- When received, manuscripts are first evaluated in terms of quality and fit with the Statement of Editorial Policy.
- Author(s) should ensure that the work is original, has not been published previously and it is not under consideration for publication elsewhere.
- Articles must report new theoretical and/or empirical results that have not been published previously. If the manuscripts employ data that are expressed in another manuscript, Editor must be informed of this at the time of the submission.
- Article must not have been previously submitted to *JBS* for review. If the manuscript, or an earlier version of it, was previously rejected by *JBS*, this

International (CC BY 4.0) license.

Manuscript Submission:

- Author(s) may submit an article through the journal's online submission system or through an email as a word file. In case of online submission, author(s) are required to Sign up. On successful registration, author can upload the article. Alternatively, an article may be sent through email at journal_bs@greenwich.edu.pk.
- The email submissions should be sent along with the covering letter (available on website), giving unabbreviated names and email addresses of all the authors, indicating the corresponding author and certifying that the paper has neither been, nor will be sent elsewhere for publication.
- Authors should note that all submitted articles are refereed through a double-blind peer review process which means that author's identities remain unknown to reviewers and vice versa throughout the reviewing process.
- Articles should be about 6,000 to 9,000 words. Word count includes everything: abstract, text, endnotes, references, tables, figures and appendices.
- Articles should be formatted in single or double spacing, in Times New Roman, size 12 font.
- The first page should contain the full title of the article and full names and affiliations of all authors including email address of the corresponding author.
- The format of the manuscript should be as follows:
 - i. Abstract (up to 250 words)
 - ii. Keywords (up to 06 words)
 - iii. Introduction
 - iv. Literature Review

information must be clearly communicated by the corresponding author to the Editor at the time of submission.

- The only exception to the “previous publication” rule is a paper included in a conference proceeding, where the paper is work in progress toward the manuscript submitted to *JBS*. In this case, the Author must inform the Editor about the conference details, and the title of the conference proceedings publication. *JBS* will have the copyright to all published articles.
- Publication must be approved by all author(s) of the paper through undertaking (available on the Journal’s website).
- Author(s) should carefully list and order their names on the first page of the article. *JBS* allows maximum three (03) authors/co-authors for each manuscript. An author’s name will not be added or deleted after submission.
- Articles should be in English but *JBS* welcomes manuscripts from authors whose first language is not English. Manuscripts must be formatted according to the *JBS* format. Authors of poorly worded manuscripts are advised to seek professional editing assistance prior to submission otherwise the paper may be desk rejected.
- Manuscripts will not be accepted after the closing date mentioned in the ‘Call for Papers’ for each edition.
- Author(s) should communicate the Editor/Editorial through emails only, regarding paper publication status and related matters.
- The review process may take from eight weeks to twenty four months depending upon response from the reviewers and compliance from authors. After satisfactory review, the editorial board accepts the paper for publication.
- All papers are published under Creative Commons Attribution 4.0

- v. Research Methodology
 - vi. Results and Conclusion
 - vii. Research Recommendations (if any)
 - viii. Acknowledgement (if any)
 - ix. References (APA 6th Style)
- Research notes should be under 4,000 words, including everything in the manuscript. Research notes should have the same rigor, style and tone as full-length articles. Research notes are diverse from articles in their contribution as they cover a specific audience, are more technical.
 - References should be verifiable and cited in the text by the last name of the author (all authors, if max four, the first author and et al when more than four) followed by the year, in descending chronological order. All references in the bibliography should be listed in alphabetical order of the authors last names followed by date of publication and other complete details.
 - There should be at least 20 references given in the manuscript. References should be cited from new/latest studies. Anonymous (Anon) references are not accepted. The Journal follows APA 6th referencing style.
 - The manuscript should include all necessary and complete information within the main text, not as footnotes & Endnotes.
 - Authors will make sure that all tables, graphs, and diagrams are in black and white in Times New Roman, font size 10. Tables in picture format will not be accepted.
 - Manuscripts not following the guidelines will be returned immediately without review.

After Acceptance:

- Authors will be notified about the acceptance / rejection of the paper through email.

- Accepted manuscript will be sent to the corresponding author for final proof reading. No editing or proofreading will be allowed after publication of an article.

Publication Ethics

- The Higher Education Commission of Pakistan has prepared Publication Ethics guidelines for all its approved Journals. This journal follows these guidelines which are available at www.greenwich.edu.pk/publications/jbs



Greenwich University

Pakistan

Call for Papers

The editorial team of the *Journal of Business Strategies (JBS)*, initiates a “Call for Papers” in all areas of Business Management. We welcome high quality original research papers, survey papers, case studies, review papers and extended version of scholarly articles presented in conferences, for forthcoming issue of *JBS* to be published in June 2026. The last date for submission for the upcoming issue is July 15, 2026. Manuscripts received after the deadline will not be considered for publications.



- The journal is published semi-annually by the Faculty of Management Sciences, Greenwich University, in the month of June and December.
- Any suggestions / opinions / comments may be forwarded to the Editor on the following e-mail address: journal_bs@greenwich.edu.pk

Note: All opinions expressed / conclusions drawn / statements of fact in the research papers do not necessarily reflect the views of the University or the Editorial Board.

	Annual	Per copy
Inland:	Rs.500/-	Rs.300/-
Overseas :	\$ 25/- Postage included	\$ 13/- Postage included



Greenwich University

PAKISTAN

DK-10, 38 Street, Darakshan, Phase VI, DHA, Karachi-75500, Pakistan.
 Tel: +(9221) 3584-0397/98, 3584-7662, 3584-7664, UAN: 111-202-303
 E-mail: gu@greenwich.edu.pk, URL: www.greenwich.edu.pk