ISSN E: 3006-1466
ISSN P: 3006-1458
CONTEMPORARY JOURNAL OF SOCIAL SCIENCE REVIEW
CJSSR
CONTEMPORARY JOURNAL OF SOCIAL SCIENCE REVIEW
Vol.02 No.04 (2024)

EVALUATING THE PAKISTAN AS AN IMPORTING COUNTRY: A GREY INCIDENCE MODELLING

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Abstract
The study is aimed at evaluating the Pakistan's position as an importing country against the selected sixty-eight countries. The design of the study is review of literature, data elicitation, and Grey Relational Analysis (GRA). Population under study comprises of all sovereign countries of the world since imports are common phenomenon world over. Sampling design is non-probability based purposive sampling. All countries, the data of that was available on website of World Bank i.e. World Development Indicators (WDI) are included in sample. Data are taken from WDI and have been analyzed through technique of GRA. Results of analysis show that Pakistan occupies fifty-seventh position among sixty-nine countries. Germany occupies first position and Brazil occupies sixty-ninth position. This is a real time data based study having propounding practical and theoretical implications for the stakeholders.
Keywords: *Pakistan, Position, Global Trade, Imports, Grey Relational Analysis (GRA), Grey Incidence Modelling*

INTRODUCTION

Global trade like imports and exports plays a crucial role in shaping the economic development of nations. Imports are important for developing countries like Pakistan. Understanding a country's position in global imports background is essential for shaping trade policies, identifying economic dependencies, and making strategic decision to growth and sustainability. Huang, Lin, & He (2024) describe the role of trade policies in promoting environmental sustainability via productivity-enhancing imports while bridging gaps in the trade-energy efficiency literature with a micro-theoretical model. As Zhang & Zhou (1995) discuss that imports are important in improving domestic production, supporting industrial growth, filling gaps in technology and providing access to essential raw materials (Tahir, Khan, & Shah, 2015). For countries like Pakistan, imports are crucial for fulfilling energy, industrial and service's needs. Understanding the dynamics of Pakistan's import position relative to other countries is essential for strategic trade development and economic planning (Siddiqi et al., 2014; Ahmad et al., 2022). Exploring how imports, drivers and mechanisms of imports shocks impact domestic economic growth is important for researchers and policy makers (Ali & Chani, 2013; Zeng et al., 2024). The primary imports of Pakistan include petroleum, edible oil, electronics, machinery, iron, pharmaceuticals, organic chemicals, vehicles and defense-related products. Rind, et al., 2020 discussed in their paper that Pakistan's import mostly depends on fossil fuels, petroleum products, machinery, plastic, transport, equipment, tea, paper, edible oils, iron, and steel. Pakistan's highly dependency on imports is major reason of trade deficit in Pakistan (Ali & Naeem, 2017; Ahmad et al., 2018; Audi & Ali, 2018). Natural gas, including LNG is a critical resource for industrial and agriculture growth in economies reliant on imports, such as Bangladesh and Pakistan (Mehmood et al., 2013; Alam, et al., 2019). Key trading partners are China, the USA, and Saudi Arabia, while trade with other countries remains minimal. Over the past decade, the Pakistan's import profile has evolved with key partners such as China and the United States

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CONTEMPORARY JOURNAL OF SOCIAL SCIENCE REVIEW
CJSSR
CONTEMPORARY JOURNAL OF SOCIAL SCIENCE REVIEW
Vol.02 No.04 (2024)

taking leading roles, yet challenges persist, including fluctuating trade balances, limited export strategies and growing reliance on specific markets (e.g., manufacturing, food and services). Imports of food often seen as a threat to domestic producers, while their broader economic impacts are overlooked (Ali & Chani, 2013; Williams et al., 2017; Roussel et al., 2021). Bukhari, et al., (2023) highlight how consumer purchase behavior in Pakistan are influenced by western imported food products, providing insights into the demand for imports and the factors that drive consumption. Despite all these developments, it is important to assess Pakistan comparison with other countries regarding its import behavior, diversity and dependence. Globally, the economic impacts of imports vary. While consume able imports may offer limited benefits, importing capital goods and advanced technologies can significantly boost economic growth (Tahir et al., 2015; Kallianotios, 2022; Sossounov & Kolenikov, 2023). For Pakistan, adopting a strategic approach is essential to drive industrial innovation and resilience by focusing on capital goods and technologies. Islam et al., (2012) discussed how imports, especially machinery and technology, drive economic growth by developing industrialization and technical capacities. It is crucial for Pakistan to reassess its import dependencies and identify opportunities to expand and strengthen its economic flexibility. Co (2023) highlights that imports plays a critical role in amplifying a nation's capital stock, facilitating technology transfers, and enhancing production capacities, particularly in developing economies like those in Sub-Saharan African. This perspective is highly relevant for understanding Pakistan's reliance on imports for industrial machinery and raw materials to support domestic industries. Although Pakistan has a large import portfolio, there is little research comparing its global trade position and dependencies with other countries. Factors like strained relations with India, war and political instability in Afghanistan, lack of development of transportation infrastructure and conflicts in tribal and Baluchistan regions have blocked trade diversification and expansion toward the east and west. These constraints limit Pakistan's ability to develop effective trade policies and mitigate associated risks. Farooqi (2014) applies ARIMA models to forecast Pakistan's imports and exports, indicating their effectiveness in taking historical trends and predicting future trade flows. This approach complements to this study's focus on analytical methods like Grey Relational Analysis (GRA). The objectives of this study are: i) to evaluate Pakistan's import trends and position compared to other countries, and ii) to provide policy recommendations based on the findings from GRA to improve trade balance and economic resilience. This provides a clear picture of Pakistan's global import position. The study considered lot a wide range of methodological choices for and found GRA an appropriate choice a used in Basit, et al., 2019; Basit, Qazi & Khan 2021; Naeem, Muhammad & Niazi, 2021; Niazi, Qazi, & Basit, 2021; Qazi, et al., 2020 and Qazi, et al., 2021b. The choices include considering Technique for Order of Preference by Similarity to Ideal Solution (TOPSIS), Stepwise Weight Assessment Ratio Analysis (SWARA), VIekriterijumsko KOmpromisno Rangiranje (VIKOR), Grey Relational Analysis (GRA), Analytical Hierarchy Process (AHP) and, Analytical Network Process (ANP). Ultimately, this research used Grey Relational Analysis (GRA) technique due to its suitability for analyzing relationships between multiple variables in order to evaluate Pakistan's import position relative to sixty-nine other countries. The methodology involves collecting data on nine import-related indicators taken from the WDI: including commercial services, ores and metals, and imports of goods and services (Table 1). This provides insights to policymakers and other stakeholders. The rest of the study is structured as follows: a literature review, methodology using GRA for data analysis, results, discussions and a conclusion that includes key insights and recommendations to improve trade policy.

LITERATURE REVIEW

Despite an expanding amount of research on global trade dynamics, there is significant gap in understanding Pakistan's position as an importing country within the broader global trade framework. While some existing studies have analyzed Pakistan's trade deficits and its reliance on imports from major partners, there is limited comparative research examining Pakistan's import position in relation to a broader set of countries globally. This literature explores databases such as ScienceDirect, Emerald, JSTOR, Taylor & Francis and others, provides relevant data and insights. It underscores the critical role of imports in economic development, while also highlighting the significant disparities among different countries in terms of import dynamics and trade dependencies. For instance, research on Saudi Arabia's demand for imports, particularly in the context of the almost ideal demand system, sheds light on how countries can balance their import dependencies and manage price elasticity in global trade (Sever, 2019; Iqbal, 2018; Alnafissa & Aleriny, 2020; Sun & Chang, 2020; Andreou,

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ISSN P: 3006-1458
CONTEMPORARY JOURNAL OF SOCIAL SCIENCE REVIEW
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Vol.02 No.04 (2024)

2021; Mordecai & Akinsola, 2021; Cizakca, 2024). It's important to consider how changes in relative import prices can impact the price sensitivity of imports, or price elasticity. Fukumoto (2024) discussed the role relative imports prices in shaping imports demand elasticity, which could be curial to understanding Pakistan's import balance and dependency. Additionally, factors such as political instability, infrastructure issues, and regional conflicts, which make it harder for Pakistan to diversify its trade, have not been comprehensively explored in relation to its import dependencies. In examining Pakistan's import dependencies, especially in energy sectors, reducing energy imports is essential for achieving greater energy security while minimizing environmental impacts. Anwar (2016) highlights the importance of reducing energy imports to improve energy security and environmental sustainability in Pakistan. Malik & Chaudhry (2012) analyze Pakistan's imports during the 1990s, focusing on key determinants in comparison with other Asian countries. However, there is limited research comparing Pakistan's import dynamics with other countries on a global scale. Ahmad, et al., (2024) examine the influence of macroeconomic factors such as Foreign Direct Investment (FDI) and the import price index on Pakistan's import demand, but the study does not extend to a global comparison of import trends. Guo, et al., (2019) examine the strategic construction of the China-Pakistan-Iran-Turkey energy corridor, which can be linked to Pakistan's energy imports and trade partnerships. This can provide context for understanding Pakistan's import dependency on energy products. A review of Pakistan's trade deficit with China, highlighting the growing import dependency on China and some implications for future bilateral trade agreements. However, their study does not consider Pakistan's position within global trade dynamics or compare its imports with other countries (Irshad, Xin & Arshad, 2018). Pakistan's trade policy history, which has shifted between many ups and downs, starting with a restrictive approach of trade policy due to underdeveloped infrastructure and weak industrial base (Sultan & Munir, 2015). Looney (2002) identifies political and policy factors contributing to Pakistan's over reliance on imports. However, the study does not address the broader international trade patterns impacting Pakistan. Other research work also highlights similar issues regarding Pakistan's reliance on specific trading partners and the effects for economic stability. By positioning this work within the broader context, it contributes to ongoing discussions on enhancing Pakistan's trade strategies in an interconnected global economy. Khiyavi, Moghaddasi, & Yazdani (2012) apply the Trade Gravity Model to fourteen developing countries, showing that imports and exports significantly influence bilateral trade flows by using the panel data in the study for the period of 1991 to 2009. Husna (2024) highlights how Indonesia-Pakistan Preferential Trade Agreement (IPPTA) helps improve exports of palm oil of Wilmar International by lowering tariffs and strengthening trade ties, while also mentioning challenges like global market conditions and internal policies, using theory of Malfred Esig. While useful for understanding global trade patterns. Ali & Li (2016) discuss trade imbalances and policy recommendations for Pakistan and other countries. Their insights offer broader understanding of trade imbalances but do not directly address Pakistan's unique import dynamics. Global trade has expanded rapidly, permitting countries to access goods and services worldwide. In South Asia, regional trade agreements like South Asian Free Trade Area (SAFTA) aim to boost trade, but Pakistan's geopolitical situation limits its ability to diversify trading partners, relying heavily on China and the Middle East (Ali & Li, 2016). While imports provide access to advanced technologies, they also contribute to Pakistan's economic instability. Pakistan, with its high import dependency, needs to strengthen regional partnerships to reduce vulnerability and explore untapped markets. Turay (2019) found that exports have positive impact on economic growth and imports have negative effect. So, the government should focus on policies that promote exports and reduce reliance on imports (Junejo, et al., 2021). Awan & Mukhtar (2019) analyze the trade deficits and their negative impact on Pakistan's economic growth, revealing that Foreign Direct Investment (FDI) has a positive impact on trade deficit in the long run. This research study builds on existing literature that underscores the need for expanded trade relationships and policy reforms. Evaluating the literature on the import trade sector is crucial to determining Pakistan's position on a global scale.

METHODOLOGY

The study follows positivism as research philosophy, deductive approach and grey systems theory as used in Basit, Qazi, & Niazi, 2020b; Qazi, Niazi, & Basit, 2021; Niazi, at al., 2021a; Basit, Khan, & Qazi, 2021 and Qazi, Niazi, & Inam, 2019). It is based on the belief that the data from various countries can be measured, observed and analyzed by using GRA methodology. This study uses quantitative data and GRA to compare Pakistan's import

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ISSN P: 3006-1458
CONTEMPORARY JOURNAL OF SOCIAL SCIENCE REVIEW
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CONTEMPORARY JOURNAL OF SOCIAL SCIENCE REVIEW
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patterns with those sixty-eight other countries across nine key indicators (Table 1), such as total import value and trading partner diversity, to identify strengths and weaknesses in Pakistan's import strategies. The GRA methodology allows for a comprehensive assessment of the relational dynamics between these indicators and provides insights into Pakistan's position in global trade. GRA compares the factors quantitatively in a dynamic manner using information from the Grey System, by establishing relationship with among the factors based on their level of similarity and variability (Tsai, Chang & Chen, 2003). The population for this research focus on all the countries engaged in international trade globally. The sampling method involves selecting sixty-nine countries based on the availability of key indicators data for 2023 from WDI (Table 1) and based on their relevance to Pakistan's trade patterns. A purposive sampling design used to analysis of countries for which relevant data is available, including Pakistan. GRA is also used for decision making in multi attribute cases. The major advantages of GRA are based on discrete unique data handling, easy calculations and being straightforward and effectiveness in decision-making, using grey numbers, equations and matrices (Afshari, et al., 2011)

Mathematical Framework

The follows stepwise procedure and mathematical algorithm as used in Basit, et al., 2021; Basit, Qazi, & Niazi, 2020a; Niazi, et al., 2021b; Qazi, et al. 2021a; and Rashid, et al., 2021. The generic formula for representing the decision matrix of data set used in (Qazi, et al., 2021):

$$x_i(k) = \begin{bmatrix} x_1(1)x_2(2) & \cdots & x_1(m) \\ \vdots & \ddots & \vdots \\ x_n(1)x_n(2) & \cdots & x_n(m) \end{bmatrix}$$

Firstly, data has been analyzed and identified as "Minimum Acceptance" as imports indicators met criteria minimum acceptance. So, Normalization method can be made by using following formula:

$$x_i^*(k) = \frac{max\ x_i^{(0)}(k) - x_i^{(0)}(k)}{max\ x_i^{(0)}(k) - min\ x_i^{(0)}(k)}$$

Simplest method of normalization can be used by dividing sequence values by the value of sequence as;

$$x_i^*(k) = \frac{x_i^{(0)}(k)}{x_i^{(0)}(1)}$$

After normalization method, the Deviation Sequence is calculated by using:

$$\Delta_{oi}(k) = |\, x_o^*(k)\,, x_i^*(k)|$$

After that Grey Relational Coefficient (GRC) is calculated based on normalized sequences and deviation sequence (Yang, 2006).

$$\gamma[\, x_o^*(k)\,, x_i^*(k)] = \frac{\Delta_{min} + \xi\Delta_{max}}{\Delta_{oi}(k) + \xi\Delta_{max}} \qquad , 0 < \gamma[\, x_o^*(k)\,, x_i^*(k)] \leq 1$$

$x_o^*(k)$ is Reference Sequence and $x_i^*(k)$ is Comparable Sequence and $\Delta_{oi}(k)$ is the Deviation Sequence. Similarly maximum deviation and minimum deviation is calculated by using:

$$\Delta_{max} = \max_{\forall j \in i} \max_{\forall k} \left|\, x_o^*(k)\,, x_j^*(k)\right|$$

$$\Delta_{min} = \min_{\forall j \in i} \min_{\forall k} \left|\, x_o^*(k)\,, x_j^*(k)\right|$$

After Grey Relational Grade (GRG) is calculated as weighted sum of GRC by using:

$$\gamma(\, x_o^*\,, x_i^*) = \sum_{k=1}^{n} \beta_k \gamma[\, x_o^*(k)\,, x_i^*(k)]$$

$$\sum_{k=1}^{n} \beta_k = 1$$

ISSN E: 3006-1466
ISSN P: 3006-1458
CONTEMPORARY JOURNAL OF SOCIAL SCIENCE REVIEW
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CONTEMPORARY JOURNAL OF SOCIAL SCIENCE REVIEW
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Table 1: Imports Relevant Indicators

Sr.	Indicator	Description
1	Imports of goods and services (current US$)	Total value of goods and services imported by a country, measured in current U.S. dollars, without adjusting inflation.
2	Commercial services imports (currents US$)	Total value of services (e.g., transportation, travel, business services) purchased from others in current U.S. dollars.
3	Ores and metals imports (%of merchandise imports)	Percentage of merchandise imports of ores and metals, indicating reliance on raw material imports.
4	Imports of goods and services (constant LCU)	Total import value measured in the country's local currency, measured at current prices without adjusting for inflation.
5	Imports of Goods and Services (current LCU)	Total value of imports adjusted to 2015 U.S. dollars to remove inflation effects, ensuring consistent year-to-year comparisons.
6	Imports of Goods and Services (constant 2015 US$)	Yearly percentage change in the value of imported goods and services, reflecting growth or decline in import activity.
7	Imports of Goods and Services (annual % growth)	Portion of a country's GDP comprised of imports, indicating dependency on external goods and services relative to its economy.
8	Imports of Goods and Services (% of GDP)	Portion of a country's GDP comprised of imports, indicating dependency on external goods and services relative to its economy.
9	Imports of Goods and Services (Bop, current US$)	Value of imports recorded in the balance of payments (BoP), reflecting official financial records in current U.S. dollars.

ANALYSIS, RESULTS AND DISCUSSION

This section discussing the analysis, results and interpretation of the importing indicators used to calculate Pakistan's position as an importing country by using GRA.

Analysis

The data has been collected from the different countries of the world for the analysis of Imports Comparison of Pakistan with various countries with GRA. Indicators on the imports were obtained from the website of WDI (Table 1).

Table 2: Specification of System Variables.

Code	Variables	Criteria
1	Commercial service imports (current US$)	Minimum Acceptance
2	Ores and metals imports (% of merchandise imports)	Minimum Acceptance
3	Imports of goods and services (constant LCU)	Minimum Acceptance
4	Imports of goods and services (current US$)	Minimum Acceptance
5	Imports of goods and services (current LCU)	Minimum Acceptance
6	Imports of goods and services (constant 2015 US$)	Minimum Acceptance
7	Imports of goods and services (annual % growth)	Minimum Acceptance
8	Imports of goods and services (% of GDP)	Minimum Acceptance
9	Imports of goods and services (BoP, current US$)	Minimum Acceptance

In Table 1, variables are assigned to code for further working. Imports data of different indicators of the countries are recorded. The total data of sixty-nine countries are set by the alphabetic order. The skipping table is formed for a significant framework as shown in Table 3 by establishing a decision matrix data set as follows in formula:

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ISSN P: 3006-1458
CONTEMPORARY JOURNAL OF SOCIAL SCIENCE REVIEW
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$$x_i(k) = \begin{bmatrix} x_1(1)x_2(2) & \cdots & x_1(m) \\ \vdots & \ddots & \vdots \\ x_n(1)x_n(2) & \cdots & x_n(m) \end{bmatrix}$$

Table 3: Imports relevant data of countries

Sr.	Country	1	2	3	4	5	6	7	8	9
1	Argentina	22276572382.6	2.91	201101268300.0	90018415643.89	26668679562600.0	79929762814.2	2.16	14.05	92299514643.47
2	Armenia	3285391310.90	3.29	3803531267762.	14251626834.49	5593478500000.00	9896231392.82	28.30	58.86	14481394039.43
….	….	….	….	….	….	….	….	….	….	….
….	….	….	….	….	….	….	….	….	….	….
34	India	177305203918.	6.04	4346728449845 9.10	850641682919.7	70424402387364.6	804945624101.	10.91	23.96	857795573940.8 6
35	Ireland	389255742820.	1.24	455884774000.0	548970354208.8	507709500000.00	505810033392.	0.41	100.6 1	548826542316.3 5
….	….	….	….	….	….	….	….	….	….	….
….	….	….	….	….	….	….	….	….	….	….
68	Uruguay	5824265999.05	1.47	505483793437.4	18719846971.75	726729967917.25	16671353423.6	6.00	24.24	18857091688.07
69	Uzbekistan	7590326736.15	2.17	5624331160120 0.00	41335132987.34	485060900000000.	35277725381.9	11.50	45.48	42097723415.20

After Table 3, formatted a table named Table 4 as Reference Sequence and Comparable Sequences by adding a new row named as Reference.

Table 4: Reference Sequence and Comparable Sequences

Sr.	Country	1	2	3	4	5	6	7	8	9
0	Reference	259693023.17	0.32	-804886738900.00	1400837556.99	3469000000.00	-445226052466.87	-261.88	14.05	1426533532.05
1	Argentina	22276572382.64	2.91	201101268300.00	90018415643.89	26668679562600.0	79929762814.23	2.16	14.05	92299514643.47
2	Armenia	3285391310.90	3.29	3803531267762.0	14251626834.49	5593478500000.00	9896231392.82	28.30	58.86	14481394039.43
….	….	….	….	….	….	….	….	….	….	….
….	….	….	….	….	….	….	….	….	….	….
34	India	177305203918.6	6.04	43467284498459.10	850641682919.73	70424402387364.60	804945624101.87	10.91	23.96	857795573940.86
35	Ireland	389255742820.5	1.24	455884774000.00	548970354208.83	507709500000.00	505810033392.67	0.41	100.61	548826542316.35
….	….	….	….	….	….	….	….	….	….	….
….	….	….	….	….	….	….	….	….	….	….
68	Uruguay	5824265999.05	1.47	505483793437.46	18719846971.75	726729967917.25	16671353423.69	6.00	24.24	18857091688.07
69	Uzbekistan	7590326736.15	2.17	56243311601200.00	41335132987.34	485060900000000.00	35277725381.91	11.50	45.48	42097723415.20

There is no standard of what should be the value of the $x_0^{(o)}$reference sequence shown in Table 4. As imports are minimum acceptance so that reference sequence values equal to the minimum of the column values.

Table 5: Normalized Comparable Sequences

Sr.	Country	1	2	3	4	5	6	7	8	9
0	Reference	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
1	Argentina	0.9565	0.7902	0.9954	0.9537	0.945	0.7439	0.0901	1.0000	0.9532
2	Armenia	0.994	0.7601	0.9787	0.9933	0.9885	0.7781	0.0000	0.7327	0.9933
….	….	….	….	….	….	….	….	….	….	….
….	….	….	….	….	….	….	….	….	….	….
34	India	0.6501	0.5371	0.7957	0.5562	0.8548	0.3904	0.0599	0.9409	0.5585
35	Ireland	0.2312	0.9255	0.9942	0.7138	0.999	0.5363	0.0961	0.4836	0.7178
….	….	….	….	….	….	….	….	….	….	….
….	….	….	….	….	….	….	….	….	….	….

ISSN E: 3006-1466
ISSN P: 3006-1458
CONTEMPORARY JOURNAL OF SOCIAL SCIENCE REVIEW
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CONTEMPORARY JOURNAL OF SOCIAL SCIENCE REVIEW
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68	Uruguay	0.989	0.9076	0.994	0.9909	0.9985	0.7748	0.0769	0.9393	0.991
69	Uzbekistan	0.9855	0.8504	0.7368	0.9791	0.0000	0.7657	0.0579	0.8125	0.979

The values in Table 4 have minimum acceptance, so that normalized values were obtained by using equation in Table 5. For instance, 1 for Argentina $x_1^*(1)$ was calculated as follows

$$x_i^*(k) = \frac{max\, x_i^{(0)}(k) - x_i^{(0)}(k)}{max\, x_i^{(0)}(k) - min\, x_i^{(0)}(k)} = \frac{506216838978.8670 - 22276572382.64}{506216838978.8670 - 259693023}$$
$$= 0.9565$$

Similarly, other values were obtained by equation. After normalized sequence obtained, firstly the deviation sequence is calculated to calculate GRC. The calculated values are as in Table 6.

Table 6: Deviation Sequence

Sr.	Country	1	2	3	4	5	6	7	8	9
0	Reference	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
1	Argentina	0.0435	0.2098	0.0046	0.0463	0.0550	0.2561	0.9099	0.0000	0.0468
2	Armenia	0.0060	0.2399	0.0213	0.0067	0.0115	0.2219	1.0000	0.2673	0.0067
….	….	….	….	….	….	….	….	….	….	….
….	….	….	….	….	….	….	….	….	….	….
34	India	0.3499	0.4629	0.2043	0.4438	0.1452	0.6096	0.9401	0.0591	0.4415
35	Ireland	0.7688	0.0745	0.0058	0.2862	0.0010	0.4637	0.9039	0.5164	0.2822
….	….	….	….	….	….	….	….	….	….	….
….	….	….	….	….	….	….	….	….	….	….
68	Uruguay	0.0110	0.0924	0.0060	0.0091	0.0015	0.2252	0.9231	0.0607	0.0090
69	Uzbekistan	0.0145	0.1496	0.2632	0.0209	1.0000	0.2343	0.9421	0.1875	0.0210

The values in Table 5 equal to absolute value of the difference between reference sequence and comparable sequence. For instance, 2 for Armenia was calculated as follows using

$$\Delta_{02}(2) = |\, x_o^*(2)\,, x_2^*(2)| = |1 - 0.7601|$$
$$= 0.2399$$

Similarly, other values were obtained by equation. After deviation sequence obtained, take next step to calculate GRC by using equation.

Table 7: Grey Relational Coefficients

Sr.	Country	1	2	3	4	5	6	7	8	9
0	Reference	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
1	Argentina	0.920	0.704	0.991	0.915	0.901	0.661	0.355	1.000	0.914
2	Armenia	0.988	0.704	0.959	0.987	0.977	0.693	0.333	0.652	0.987
….	….	….	….	….	….	….	….	….	….	….
….	….	….	….	….	….	….	….	….	….	….
34	India	0.588	0.704	0.710	0.530	0.775	0.451	0.347	0.894	0.531
35	Ireland	0.394	0.704	0.988	0.636	0.998	0.519	0.356	0.492	0.639
….	….	….	….	….	….	….	….	….	….	….
….	….	….	….	….	….	….	….	….	….	….
68	Uruguay	0.978	0.704	0.988	0.982	0.997	0.689	0.351	0.892	0.982
69	Uzbekistan	0.972	0.704	0.655	0.960	0.333	0.681	0.347	0.727	0.960

$$\gamma[\, x_o^*(k)\,, x_i^*(k)] = \frac{\Delta_{min} + \xi\Delta_{max}}{\Delta_{oi}(k) + \xi\Delta_{max}} \qquad , 0 < \gamma[\, x_o^*(k)\,, x_i^*(k)] \leq 1$$

When calculating GRC, the coefficient ξ in equation was chosen as 0.5. As an example to calculating of GRC 3 for India firstly, the biggest deviation and the smallest deviation are needed.

$$\Delta_{max} = \max_{\forall j \in i} \max_{\forall k} \left|\, x_o^*(k)\,, x_j^*(k)\right| = \left|\, x_o^*(3)\,, x_j^*(3)\right| = 1$$

ISSN E: 3006-1466
ISSN P: 3006-1458
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$$\Delta_{min} = \min_{\forall j \in i} \min_{\forall k} \left| x_o^*(k), x_j^*(k) \right| = \left| x_o^*(3), x_j^*(3) \right| = 0$$

After that, by the help of the equation, GRC was calculated as follows.

$$\gamma[x_o^*(k), x_i^*(k)] = \frac{\Delta_{min} + \xi\Delta_{max}}{\Delta_{oi}(k) + \xi\Delta_{max}} = \frac{0+0.5(1)}{0.2043+0.5(1)}$$
$$= 0.710$$

Rest of the values calculated similarly, after that Grey Relation Grade (GRG) calculated in Table 8.

Table 8: Grey Relational Grade

Sr.	Country	GRG
0	Reference	1.0000
1	Argentina	0.8180
2	Armenia	0.8089
….	….	….
….	….	….
34	India	0.6145
35	Ireland	0.6363
….	….	….
….	….	….
68	Uruguay	0.8406
69	Uzbekistan	0.7044

GRG is calculated by using the equation of Uzbekistan.

$$\gamma(x_o^*, x_i^*) = \sum_{k=1}^{n} \beta_k \gamma[x_o^*(k), x_i^*(k)]$$

= 0.11 (0.972+0.704+0.655+0.960+0.333+0.681+0.347+0.727+0.960)

= 0.7044

As we have sixty-nine numbers of countries so $\beta_k = 0.11$ (β_k =1/9). GRG of one country is equal to the sum of all indicators i.e. shown in above given example. All the Grades is calculated same way.

Results

As we measured the Pakistan's position as an importing country compared to the World, by using GRA and key import indicators as shown in Table 1. This finding offer strategic insights for enhancing domestic production, economic resilience and diversifying trade policies. The GRA method identified that Pakistan's import relationships with the core countries, particularly China and the UAE are highly strong. This limited dependency on a limited number of countries highlights the potential risks to Pakistan's economic stability. The higher the grade, the more favorable a country import performance is considered. Countries such as Germany, USA, Canada and China are likely to have higher GRGs due to their diversified and high-value imports. Pakistan has lower GRG compared to most of the countries, reflecting a reliance on a narrow range of goods, primarily including petroleum products, machinery and edible items. After the grading process, countries are ranked from highest to lowest based on their GRGs. This ranking reveals that Pakistan falls in the lower range, holding the fifty-seventh position out of sixty-nine countries (Table 9).

Discussion

The analysis to evaluate the Pakistan's position as an importing country by using GRA, ranks the country fifty-seventh out of sixty-nine countries. This indicates that performance is weak as compared to the other countries in the study, suggesting improvement needed in the areas of trade efficiency and competitiveness. The indicators selected, specifically to assess the dynamic nature of Pakistan's imports, with factors such as trade volume, economic growth, international market competitiveness, and other trade-related characteristics possible, reveal that the trade restrictions and market inefficiencies, impact Pakistan's import flexibility. Furthermore, other countries have made considerable progress in trade efficiency and competitiveness compared to Pakistan. The results provide valuable insights into Pakistan's import sector, providing a basis for targeted policies aimed at

ISSN E: 3006-1466
ISSN P: 3006-1458
CONTEMPORARY JOURNAL OF SOCIAL SCIENCE REVIEW
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enhancing international trade growth. When this study is compared with other similar studies in global marketing, we find several key differences. First, the study incorporates nine indicators related to imports, offering a comprehensive view of Pakistan's import dynamics, focusing on goods and services and impact on the economy unlike other sectors which may focus exclusively on imports, ignoring imports or balance of payments issues. Second, the relationship between some indicators may differ from studies conducted in other countries. For example, the relationship between annual import growth and contribution to GDP may be stronger in rapidly developing countries or countries with large foreign exchange reserves. Unlike Pakistan the improvement in imports can be significantly influenced by the country's reliance on specific raw materials (as reflected in higher percentages of ore metal an about imports).

Table 9: Grey Relational Grade with Rank

Country	Grade	Rank	Country	Grade	Rank	Country	Grade	Rank
Reference	1.000	0	Malaysia	0.7432	24	Namibia	0.8135	48
Germany	0.5681	1	Australia	0.7450	25	Montenegro	0.8151	49
India	0.6145	2	Chile	0.7454	26	Georgia	0.8170	50
Singapore	0.6189	3	Czechia	0.7486	27	Argentina	0.8180	51
United Kingdom	0.6219	4	Philippines	0.7714	28	Nicaragua	0.8183	52
France	0.6283	5	Slovak Republic	0.7753	29	Egypt, Arab Rep.	0.8185	53
Netherlands	0.6295	6	Norway	0.7803	30	Moldova	0.8193	54
Ireland	0.6363	7	Romania	0.7831	31	Bosnia and Herzegovina	0.8197	55
Hong Kong SAR, China	0.6428	8	Portugal	0.7874	32	Brunei Darussalam	0.8198	56
Belgium	0.6685	9	Finland	0.7875	33	Pakistan	0.8200	57
Switzerland	0.6722	10	Greece	0.7875	34	Mauritius	0.8214	58
Italy	0.6761	11	Ukraine	0.7934	35	El Salvador	0.8229	59
Canada	0.6786	12	Cyprus	0.7937	36	Belize	0.8250	60
Mexico	0.6817	13	Lithuania	0.7948	37	Iceland	0.8252	61
Colombia	0.6854	14	Israel	0.7960	38	Cabo Verde	0.8259	62
Uzbekistan	0.7044	15	Slovenia	0.7969	39	Ghana	0.8271	63
Spain	0.7089	16	South Africa	0.8004	40	Guatemala	0.8293	64
Hungary	0.7153	17	Morocco	0.8015	41	Botswana	0.8373	65
Luxembourg	0.7156	18	Estonia	0.8016	42	Bolivia	0.8375	66
Poland	0.7205	19	Bulgaria	0.8055	43	Sri Lanka	0.8404	67
Sweden	0.7261	20	North Macedonia	0.8057	44	Uruguay	0.8406	68
Denmark	0.7309	21	Latvia	0.8080	45	Brazil	0.8791	69
Austria	0.7345	22	Armenia	0.8089	46			
Paraguay	0.7394	23	Croatia	0.8099	47			

Practical implications

Pakistan's import survey highlights opportunities for Internet Service Providers (ISPs) to take advantage of growing digital demand. Given the increasing importance of imports in the infrastructure sector, ISPs may need to improve their infrastructure to boost productivity and Internet-based services. Increased import of business services including IT related services provides opportunities for software vendors to expand their product offerings in Pakistan. It includes providing business management, logistics and digital process improvement solutions to support international trade. The World Trade Organization (WTO) (2005) aims to reduce trade barriers worldwide,

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ISSN P: 3006-1458
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and trade liberalization can also benefit Pakistan, enabling local industries to lower dependence on expensive imports by investing in domestic alternatives and improving supply chains. Hussain & Yan (2019) find that remittances drive Pakistan's imports demand, urging a focus on important imports to manage foreign exchange shortages amid global economic challenges. It is crucial understand the imports demand to balance trade in Pakistan. The government can use this research to inform business plans. Furthermore, this research underscores the need for policies aimed at reducing trade imbalances and fostering industries that rely on imports to strengthen the economy and support sustainable development. While some argue that import substitution policies foster industrial growth, others, like Bruton (1998), question their long-term viability for sustainable economic development. The study also offers a foundation for further research on how specific categories of imports such as services or infrastructure, influence long-term economic growth.

Theoretical implications

The study contributes to the understanding of international marketing, especially in the context of developing countries. It emphasizes the important role of imports in improving GDP and growth. However, a limitation of the study is that it focused only on imports without considering the impact of outsourcing on the overall trade balance. Furthermore, reliance on data from a specific point in time may not misrepresent recent economic changes such as the global supply chain. Although the choice of variables is comprehensive, it may leave out important social and political factors that affect trade such as tariffs or trade agreements. Future research should expand to include exports rather than imports and more recent data to provide a holistic view of Pakistan's trade dynamics. In addition, further analysis of the specific industries or sectors most affected by imports could provide more targeted insights for policy makers and institutions. In countries heavily dependent on imports, accurate trade data is vital for designing effective fiscal and monetary policies (De Wulf, 1981). The inclusion of qualitative data such as expert interviews can provide a greater understanding of the social and political drivers of trade.

Contribution: This study contributes to the bulk of information about: i) the Grey Relational Coefficients, ii) Grey Relational Grades, iii) Grey Relational Ranks of each country, and iv) a portion of information for policy makers.

CONCLUSION

Understanding that imports are important for developing countries like Pakistan, as it directly affects overall economic growth, trade balance and global competitiveness, not only national GDP affects import policy but also business activities, private consumption and government policy. Imports and economic growth in Pakistan are related with imports of both consumer and capital goods contributing to economic growth and productivity (Ahmad, et al., 2024). Balancing imported energy with local resources is crucial for sustaining industrial and economic growth in import dependent economies (Alam, et al., 2019). Pakistan faces major challenges in regulating imports, according to fifty-seventh out of sixty-nine countries in the Gray Relations Survey. As Pakistan inherited with a weak industrial base and government initially used the Import Substitution Industrialization (ISI) strategy to boost industries (Bader & Riazuddin, 2006). Investing in renewable projects like wind energy as demonstrated in Sindh, offers a feasible solution to reducing imports costs and fostering sustainable growth (Adnan, et al., 2021). This research, based on comparison of Pakistan with other sixty-eight countries provides a benchmark to understand the rank of Pakistan in imports sector, weighting strength and fragile areas for improvement. This study provides valuable insight for policymakers and stakeholders to improve trade strategies and enhance Pakistan's global economic integration. In this study, data of sixty-nine countries under nine different indicators is obtained from World Development Indicators (WDI) by using GRA. Pakistan rank is fifty-seventh out of sixty-nine countries, underscoring its challenges. The major reason of Pakistan's trade imbalance is less exports than imports, Hussian (2014) discussed about how exports growth can be act like as an engine for economic growth, increasing production and employment. Also, Henneberry and khan (2014) highlighted in their paper that both imports and agricultural exports influence Pakistan's economy by estimating three simultaneous equations model. This approach shows the interconnected relationship between imports and economic growth, indicating how they work together to shape the country's overall economic performance. This study sets the stage for future research to balance imports and exports of Pakistan for a balanced business environment.

ISSN E: 3006-1466
ISSN P: 3006-1458
CONTEMPORARY JOURNAL OF SOCIAL SCIENCE REVIEW
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