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Emerging Economies in Focus: Entrepreneurial Contributions to Economic Rankings in Developing Countries

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ABSTRACT

The objective of this research is to rank the performance of individual countries based on metrics related to economic growth and the entrepreneurial environment. An important factor in determining a country's economic progress and success is entrepreneurship. Comprehensive research was used to accomplish the goals of the study, including a thorough literature review, the collection of relevant secondary data, and a thorough analysis. The global entrepreneurship index (GEI), a prominent rating system that assesses entrepreneurial activity worldwide, served as the source of data for this study. The Global Entrepreneurship Monitor (GEM), a reputable organisation that provides useful information on a variety of parameters for ranking purposes, is the primary source of data used by the GEI. This study's research methodology, which uses a multicriteria decision-making approach, guarantees a thorough evaluation of entrepreneurship in the chosen nations. Firstly, a literature review was conducted to gain a holistic understanding of the subject matter to identify areas that require further investigation. Next, secondary data related to

entrepreneurial environment and economic growth were collected from reputable sources using four indicators startup skills, opportunity startup, product innovation and process innovation. Grey relational analysis (GRA) is selected as a significant scientific research tool for data analysis. Countries were classified according to their GRA performance and assigned various ensigns such as "much better," "better," "somewhat better," "fair," "somewhat worse," and "worse." The top twelve countries out of 88 were regarded as "much better". The remaining countries are ordered accordingly. This research has several consequences and makes valuable recommendations. The findings and recommendations of this study add significantly to the current literature on the entrepreneurial environment and economic growth, providing valuable insights. As governments aspire for economic progress, fostering a healthy entrepreneurial ecosystem will remain critical for long-term growth and prosperity.

Keywords: Entrepreneurship, Economic growth, developing countries, Global entrepreneurship index, Grey relational analysis.

Introduction

A clearer depiction of entrepreneurial environment and economic growth of different countries needs to be attained, therefore proper policies and decision can me made accordingly. The purpose of this research is to identify the reasons of insufficient economic system within developing countries and how entrepreneurial environment can be induced through activities for the improvement of economies. Moreover, few indictors are used to assure the entrepreneurial environment of selected countries i.e., startup skills, opportunity startup, product, and process innovation. There are various multi criteria techniques can be used for the ranking purpose but in this research GRA is used. Because this technique is easy to apply and less time consuming. This research is aimed to provide finest ranking of developing counties which helps policy makers, entrepreneurial aspirant, government, and researchers to design and formulate their approaches accordingly.

The research paper aims to employ the Grey Relational Analysis (GRA) technique to conduct a comprehensive analysis of developing countries, specifically focusing on their entrepreneurial environment and economic growth. The primary objective is to utilize GRA as a methodological approach to calculate the grey

relational grade, providing a nuanced understanding of the relationships between entrepreneurial factors and economic growth indicators in these nations. The research further endeavors to rank the developing countries based on the determined grey relational grades, offering insights into the relative performance and interplay of entrepreneurship and economic growth across the analyzed nations. Through this analytical lens, the study seeks to contribute valuable perspectives on the intricate dynamics shaping the developmental landscape of these countries, providing a nuanced assessment grounded in the GRA technique.

To understand the difficulties of developing nations regarding their entrepreneurial climate and economic progress, the study paper tackles important concerns. The primary goal of the study is to rank developing countries by carefully analyzing their entrepreneurial climate and perspectives on economic growth. This main query emphasizes the importance of comparing these nations' respective positions considering how entrepreneurship and economic growth interact. Furthermore, the study explores the complexities of the variables impacting the entrepreneurial climate and economic growth perspective in emerging countries. The study's specific goal is to investigate the ways in which different metrics influence the entrepreneurial environment as well as the larger picture of economic growth. The research aims to provide valuable insights into the factors that facilitate or impede entrepreneurial activities and economic advancement in developing countries by closely examining the relationships between these indicators and the observed outcomes.

A progressive entrepreneurial environment is dynamic for economic growth. Economic development is basically responsible for strong economy. However, both developing and developed economies striving to achieve superlative entrepreneurial environment within countries. Both economies are facing challenges in ensuring growth and development in their economies i.e., access to control, infrastructures, education and skills and market access. One of the most beneficial ways to overcome these challenges is to bring entrepreneurship supporting activities like enhancing tourism, manufacturing, health care, agriculture and renewable energies. Moreover, economies should involve technological innovation which leads toward high value-added products and services at micro small and medium level.

Entrepreneurial activities are assumed to be the key competitiveness of a country in this regard. As entrepreneurial firms start innovation and become more resilient. They ultimately become more able to recover very speedily when economic downturns occur. Same as if countries try to encourage entrepreneurial firms to create more of new skill-based jobs along with new innovative products and services which helps and strengthen the economy. When it comes to the developing countries where entrepreneurial environment is not much induced as it should be, all these beneficial entrepreneurial activities will result in reduction of inefficiencies and bring betterment in economic system of countries.

Additionally, it trains and sends skilled personnel to big enterprises. The expansion of entrepreneurship is largely responsible for the raise in national employment rate. Thus, entrepreneurship plays a major role in accelerating new employment prospects. Entrepreneurial endeavors increase productivity by introducing innovation to every facet of business, utilizing the available resources in the most efficient method. The significance of entrepreneurship has gained recognition since the late 2010s, coinciding with the emergence of startups as pivotal entrepreneurial endeavors. There is a clear link between entrepreneurial innovation and sustainability and effective functioning of startups, this connection is widely acknowledged (Centobelli et al., 2022; Tsolakidis, Mylonas, & Petridou, 2020). Entrepreneurial enterprises encourage innovation by opening the doors to new businesses, market products and technologies through proper research and development procedures. More than a century ago, Joseph Alois Schumpeter emphasized the pivotal role of entrepreneurship in comprehending economic growth and development. Even in the mindset of global economic slowdown, recent findings from a survey in The Economist magazine suggest that entrepreneurs are experiencing a resurgence worldwide. The dynamics of this resurgence can vary significantly based in institutional framework and the stage of development within economy. Consequently, for those interested in examining entrepreneurship on both national and international scales it becomes evident that investigating the interconnected relationship among entrepreneurship, institutions, and economic growth is a vital area of research (Acs, Szerb, & Autio, 2017).

In developing counties, traditional cultural norms and risk averse attitudes may discourage entrepreneurial pursuits, favoring more stable and secure employment options. Developed countries on other hand, often have more favorable perception of entrepreneurship, valuing innovation, risk taking, superlative entrepreneurial environment and more potential for wealth creation.

Literature Review

This literature review aims to analyze the existing body of research regarding the ranking of countries based on indicators related to the entrepreneurial environment. The objective is to identify research gaps in this field and address them. Although there is very limited research focused on country ranking, various indices such as Global entrepreneurship index (GEI) and GEM, provide some insight to this area. This research basically examines the overall significance of entrepreneurship. This research starts with the examination of entrepreneurial directories such as Global entrepreneurship index along with crucial and related indicators to assess the entrepreneurial environment and economic growth viewpoint. It then determines the significance of study and indicators. This literature is based on existing research landscape, and it encompasses different databases such as Google scholar, Emerald, Elsevier, sage publication and Taylor and Francis.

Spectrum of Entrepreneurship

Recently, a study was conducted to analyze the combination of innovation, financial and sustainable development conditions that boost the entrepreneurship level of the country. A cross-national analysis was run of the data of 64 countries by applying fuzzy set qualitative comparison analysis. The data was collected from four databases i.e., the Global entrepreneurship index, the Country risk score, the Global innovation index, the Sustainable development goal index (Cervelló-Royo, Moya-Clemente, Perelló-Marin, & Ribes-Giner, 2022). Moreover, research has been conducted on more than 100 microentrepreneurs in rural India, in which they examine the support of various stakeholder like families, communities and business partners which help to overcome institutional voids and foster entrepreneurship. in the This paper highlights that entrepreneurship is often considered as a best to tackle ongoing problems related to the poverty especially in developing countries for that they also examine the adoption of digital technologies form of smartphones

apps. The result showed that entrepreneurs have a positive and significant effect on entrepreneurship that involve digital technology and negative impact on support with business partners (Soluk, Kammerlander, & Darwin, 2021). Research has been conducted which contributes two major aspects. Firstly, a systematic conceptual approach to direct the design of entrepreneurship policies that highlights the structure factors acting as a barrier in less developing counties context. Secondly, it is based on the data of the IDE (index of dynamic entrepreneurship). Along with that this research inculcates the strengths and the weaknesses of emerging counties in the context of entrepreneurship. The result showed that policy makers should articulate their policies in more conceptualized framework (Kantis, Federico, & García, 2020).

A country level efficiency is addressed in recent research on the sample of 60 countries using data envelopment analysis. Data was collected from the Index of dynamic entrepreneurship to find the efficiency ranking. This study aggregates the performance indicators in the national system of entrepreneurship from an efficiency perspective. Surprisingly., the result showed that the top performing countries in IDE have inefficient environment whereas lower performing countries have higher efficiency scores, which demonstrate an implication for the policy makers to develop more in-depth knowledge regarding the environment (Dionisio, Júnior, & Fischer, 2021). Another study has been conducted in taking scientific inventions to market through mapping the academic entrepreneurship environment. For that, they highlighted the active contribution of academic institutions to the technological, social, and economic development of societies. To support a greater contribution of academic institutions to the social and economic development of countries and societies, this research conferred the relevance of each stage for the creation of a more innovation-friendly environment. This study also offer perspective on future recommendation opportunities and encourage studies that consider the academic entrepreneurship process from systemic perspective (Guindalini, Verreynne, & Kastelle, 2021).

A study is taken out in universities to understand entrepreneurship environment and find out which entrepreneurship condition is different from viewpoint. 40 questionnaires were filled out form different groups of Czech

university and Slovak university. CART decision tree was used to analyze the result. Two items related to macroeconomic conditions associated to entrepreneurship supported by Czech university (Belas, Gavurova, Korony, & Cepel, 2019). Another study is done to investigate the impact of entrepreneurial environment on entrepreneurial intentions and self-efficacy in the post pandemic era. Questionnaires were filled out by the college student and data was analyzed by structural equation model. Results provide important insights to improve college students' entrepreneurial intentions in post pandemic environment (Zhang & Huang, 2021).

Entrepreneurship in developing countries has been studied in research. This research conducts a comprehensive review of existing literature regarding policy entrepreneurship. The analysis encompasses a total of 47 papers published between 1993 and 2017, all of which delve into the subject of policy entrepreneurship in context of developing world. The primary objectives and contributions of this paper are twofold: firstly, it aims to provide a more detailed overview of policy entrepreneurship by focusing on two aspects. The first involves delineating the characteristics of the related studies. Secondly, involves in-depth examination of these studies. This research set a fourth a research agenda for future endeavors, exploring fresh theoretical, mythological and empirical avenues to enhance entrepreneurship in developing countries(Frisch Aviram, Cohen, & Beeri, 2020). A competitive analysis of developing, emerging and developed countries has been conducted on the bases of their ICT and Entrepreneurship in which they investigate the impact of information and communication technology on total entrepreneurial activity (TEA). Result showed that benefits of ICT in promoting entrepreneurship, developing and emerging countries are not earning more than developed ones (Afawubo & Noglo, 2022). Entrepreneurship in emerging markets differs significantly from that practiced in more advanced economies. It is crucial to gain a deeper understanding of these variations to promote a private sector growth in developing nations. We are particularly interested in exploring the dynamics of new growth focused enterprises, which possess a greater potential to generate sustainable economic expansion compared to SMEs with limited growth prospects. This research narrowed three crucial distinctions: opportunities, financial resources, apprenticeship, and human resources. These distinctions proposed a comprehensive

research agenda and the need for policy reforms in this field (Lingelbach, De La Vina, & Asel, 2005).

Entrepreneurship & its indicators

Another study has been conducted in underdeveloped institutional environments in which process innovation energies industrial competitiveness and sustainability in economy. For that research has been conducted in which it has been highlighted that co creation of providers and customers is needed in environment to bring good process innovation. This paper explores how firms use knowledge processes through co creation in process innovation developments. Researchers identify the challenges namely uncertainty and equivocality especially during the value co creation process and explain knowledge processing strategies (joint problem solving, open communication and end user involvement. It will support environment to demand process innovation (Sjödin, 2019).

Entrepreneurs face many challenges while starting a new startup. It may not be a successful attempt for many new entrepreneurs. Entrepreneur's characteristics, behaviors and other environmental influences may affect business performance. Research has been conducted which focuses on the basics of entrepreneurship such as business acumen and startup skills. Basically, this study is done on entrepreneurs setting in which entrepreneurs from different industries with more than 2 years' experience have been recruited. A qualitative research approach was used in this study and open-ended questions were asked from those entrepreneurs. This study basically examines, how much of business acumen is required to effect success and how entrepreneurs can develop business acumen.it has been concluded that business acumen and startup skill is essential for entrepreneurs. They have to learnt on order to understand for the betterment of their business (Makhele & Barnard, 2019). Moreover, a study has been done to highlight the best imitation strategies adopted by startups for the enhancement of entrepreneurial innovation. This study was conducted on 486 startup owners operating in Greece, total 289 responses were generated. Their finding demonstrated that outcome-based imitation and trait-based imitation have positive impact on entrepreneurial innovation whereas frequency-based imitation has negative impact. Additionally, from which they have concluded that managerial and entrepreneurial skills have positive impression on

entrepreneurial innovation which were incorporated as predictor of entrepreneurial innovation (Tsolakidis et al., 2020).

A study has been conducted to explore the relationship integrating new skills affect start up skills. Expansion often necessitates startups to acquire additional expertise that may not have been initially present in the founding team. Researchers investigate whether the relationship between incorporating skills and growth is influenced by timing. Distinctive panel dataset has been used encompassing Sweden's startup population from 1997 to 2012, analysis revealed that a growth rate of startup is positively associated with the early integration of new skills in their development. Whereas, introducing new skills at a later stage is linked to slower growth. Moreover, this research showed that corporate spin offs derive less benefit from the recruitment of new skills compared to entirely new startups (Grillitsch & Schubert, 2021). Many studies contribute to investigating lean startup practices by technology new ventures focus on software startup in mature entrepreneurial environment and neglect their applicability for opportunity exploitation in other technological backgrounds. A study is conducted in Brazilian technology new ventures, tentatively use lean startup strategies to exploit opportunities whether LS is suitable in emerging economy context. Data was collected from nine Brazilian biotechnology, engineering, and software startups. This study shows four activities to handle opportunity exploitation, namely 1) developing a product or services, 2) acquiring human resources, 3) gathering financial resources and 4) setting up the organization. It also highlights the constraints while adopting LS and the practices to integrate LS. Findings reveals that the systematic and comprehensive adoption of LS nurtures the development of an entrepreneurial (Silva, Ghezzi, de Aguiar, Cortimiglia, & ten Caten, 2021).

A study has been conducted to evaluate the entrepreneurial environment of certain countries and analyze than rank them based on entrepreneurship related indicators. It has bridged the gap through a profound literature leading towards the development of problem statement. Gray relational analysis has been applied on the data and rank them accordingly. Forty-eight countries have been ranked and classified on the continuum of much better to worse. This study has several practical implications of different countries, entrepreneurial ventures, policy makers and

government (Zhu et al., 2022). A study has been conducted in five cities of Spain which is supported by a survey involving 1,135 responses from students enrolled in a master's degree programs. In which researchers identified appropriate characteristics that determine the personality traits of likely entrepreneurs. This study found that knowledge of business, high level of initiative, open mindedness coming from an entrepreneurial family environment (Rosado-Cubero, Freire-Rubio, & Hernández, 2022). The rapid spread of digital technology has raised a statement that every entrepreneur has equivalent and easy access to information stocks. This research has challenged this statement by investigating the contextual influence of information availability and argue. It has been hypothesized in context where information is more eagerly available, potential technology entrepreneurs are at an advantage which resulted in higher rate of technology entrepreneurship. The finding showed that the effect of information availability on technology entrepreneurship upsurges the presences of stronger intellectual property rights along with information availability enhanced technology entrepreneurship more readily in contexts with enticements for innovation revelation (Yeganegi, Laplume, & Dass, 2021). Fifty-three economies have been studied over the period 2006-2016 to examine the link between economic complexity and entrepreneurship density. A substantial granger causality from economic complexity to entrepreneurship density, where reverse causality is not buoyed. It showed that entrepreneurship density is an inverted U-shaped function of economic complexity. It may increase business opportunity, but beyond specific threshold it induces higher risks and uncertainties which affects entrepreneurial activities (Nguyen, Nguyen, Tung, & Su, 2021). The contribution of academic institutions to the technological, social, and economic development of societies is actively increasing with its importance. A study is conducted to understand this contribution. The researcher presents a systematic review with bibliometric and network analyses of academic entrepreneurship literature. Finding identified three interconnected research activity domains that characterized the multidimensional structures of entrepreneurship in academic settings. Four stages framework consists of: idea conception, recognition of how this idea reveals value for customers and other stakeholders, development of an innovative business model, and a commercialization strategy that creates real impact.

Each step for the establishment of a more innovative friendly environment by contribution future research opportunities, to support a greater contribution of academic institution to the economic and social development of nations and societies (Guindalini et al., 2021).

Methodology

The purpose of this study is to rank developing countries based on their entrepreneurial activities and economic growth point view, for those certain indicators that have been used. secondary data is taken from Global Entrepreneurship Index; it is measured as a significant ranking system for the countries worldwide founded on the assessment of entrepreneurial activities in those countries. The values of those indicators are taken in quantitative form and the result is obtained because of collected data. There will be no thoughts of researchers involved that's why it will be considered as quantitative data. Therefore, it can be stated as a positivism philosophy. Moreover, deductive approach has been utilized, because collected data is quantitative and unknown result will be based analysis of collected data. Grey relational analysis for the establishment of ranking based on their entrepreneurial activities and economic growth viewpoint.

The data set which is used for this research is based on 137 countries including developed and developing with multiple indicators. In this research, 87 developing countries have been studied on the bases on startup skills, opportunity startup, product innovation and process innovation, as shown in Table 1.

Table 1. Original Country-Wise Data Set

Sr No.	Country	Startup skills	Opportunity startup	Product innovation	Process innovation
1	Chile	0.903	0.633	1.000	0.319
2	Lithuania	0.565	0.546	0.708	0.502
….	…….	……	……	……	……
….	…….	……	……	……	……
54	Senegal	0.146	0.094	0.063	0.380
55	Libya	0.477	0.262	0.172	0.087
….	…….	……	……	……	…….

….	…….	……	……	……	…….
86	Mauritania	0.036	0.047	0.120	0.098
87	Chad	0.025	0.053	0.155	0.100

Source: Global entrepreneurship Index.

Grey relational analysis is a part of grey system theory, which is very appropriate for resolving problems with complex interrelationships between multiple factors and variables. The primary process of GRA involves initially converting the performance of various options into a sequence that allows for comparison. This initial step is referred to as grey relational generating. Based on these sequences, a reference sequence is established which is also known as the ideal sequence. Subsequently, the grey relational coefficient is computed between each comparability sequence and the reference sequence. Lastly utilizing these grey relational coefficients, the grey relational grades is determined for each comparability sequence in relation to the reference sequence. If a comparability sequence, derived from an alternative, attains the highest grey relational grade when compared to the reference sequence then the alternative is considered as an optimal choice.

Grey Relational Analysis Algorithm

Data Preprocessing

The data has different measurable units. It must be transformed to make them comparable. For the purpose, the values of data must be transformed into 0-1 interval using one of the following formulas respectively (Ertuğrul, Öztaş, Özçil, & Öztaş, 2016):

- $x_0^{(0)}(k)$ (represents original reference sequence
- $x_i^{(0)}$(k) (represents comparable sequence)

1) If the criterion for variables is “Larger- the better” than the data will be normalized by using EQ1.

$$x_i^*(k) = \frac{x_i^{(O)}(k) - min\, x_i^{(O)}(k)}{max\, x_i^{(O)}(k) - min\, x_i^{(O)}(k)} \qquad \text{(EQ1)}$$

2) If it is “smaller-the better”, than EQ2.

$$x_i^*(k) = \frac{max\, x_i^{(O)}(k) - x_i^{(O)}(k)}{max\, x_i^{(O)}(k) - min\, x_i^{(O)}(k)} \qquad \text{(EQ2)}$$

3) If objective reached to a specific target value, then use EQ3.

$$x_i^*(k) = 1 - \frac{\left|x_i^{(O)}(k) - OB\right|}{max\left(\max x_i^{(O)}(k) - OB, OB - \min x_i^{(O)}(k)\right)} \quad \text{(EQ3)}$$

4) If there is no specific objective, then normalization will be completed by dividing reference sequence by the first value in the sequence as shown in EQ4

$$x_i^*(k) = \frac{x_i^{(O)}(k)}{x_i^{(O)}(1)} \quad \text{(EQ4)}$$

Calculation of GRA

When data is transformed into comparable form, then the GRA is calculated using EQ5 given below.

$$\gamma[x_0^*(k), x_i^*(k)] = \frac{\Delta_{min} + \xi\Delta_{max}}{\Delta_{0i}(k) + \xi\Delta_{max}},\ 0 < \gamma[x_0^*(k), x_i^*(k)] \leq 1 \quad \text{(EQ5)}$$

Deviation sequence is calculated by using EQ6 given below where $\Delta_{0i}(k)$ is deviation sequence. Between $x_0^*(k)$ reference value and $x_i^*(k)$ comparable values the term ξ distinguishes coefficient [0 and 1], which is usually takes a value of 0.5 in literature.

$$\Delta_{0i}(k) = |x_0^*(k) - x_i^*(k)| \quad \text{(EQ6)}$$

The largest deviation is calculated using EQ7

$$\Delta_{max} = \max_{\forall j \epsilon i} \max_{\forall \kappa} \left|x_0^*(k) - x_j^*(k)\right| \quad \text{(EQ7)}$$

The smallest deviations are calculated using EQ8

$$\Delta_{min} = \min_{\forall j \epsilon i} \min_{\forall \kappa} \left|x_0^*(k) - x_j^*(k)\right| \quad \text{(EQ8)}$$

Calculation of GRA Grades

Grey relational grade is weighted sum of grey relational coefficient as shown in EQ9 where $\sum_{\kappa=1}^{n} \beta_\kappa = 1$

$$\gamma(x_0^*, x_i^*) = \sum_{\kappa=1}^{n} \beta_\kappa \gamma\left[x_0^*(k) - x_i^*(k)\right] \quad \text{(EQ9)}$$

The GRA represents the level of correlation between the reference sequence and comparable sequence. If two series are alike to each other GRA grade becomes equal to 1. It also shows the level of influence applied to reference sequence by comparable sequence.

Analysis, Result and Discussion

In analysis, GRA is applying step by step as mentioned above. Then in step 2, reference and comparable series are created as shown in Table 2. Step 3 involves the development of normalized matrix (Table 3).

Table 2: Reference Sequence and Comparable Sequences

Sr No.	Country	Startup skills	Opportunity Startup	Product Innovation	Process Innovation
0	Reference sequence	0.962	0.642	1.000	0.905
1	Chile	0.903	0.633	1.000	0.319
2	Lithuania	0.565	0.546	0.708	0.502
….	…….	……	……	……	…….
….	…….	……	……	……	…….
54	Senegal	0.146	0.094	0.063	0.380
55	Libya	0.477	0.262	0.172	0.087
….	…….	……	……	……	……
….	…….	……	……	……	……
86	Mauritania	0.036	0.047	0.120	0.098
87	Chad	0.025	0.053	0.155	0.100

Table 3: Normalized Comparable Sequence

Sr No.	Country	Startup skills	Opportunity startup	Product innovation	Process innovation
0	Reference sequence	1.000	1.000	1.000	1.000
1	Chile	0.939	0.985	1.000	0.336
2	Lithuania	0.586	0.845	0.695	0.543
…..	……	……	…….	……	……
…..	……	……	…….	……	……
54	Senegal	0.147	0.119	0.019	0.405
55	Libya	0.494	0.390	0.134	0.073
…..	……	……..	……	……	……

…..	……	……..	……	…….	…….
86	Mauritania	0.033	0.044	0.080	0.085
87	Chad	0.021	0.053	0.116	0.087

In step four deviation sequence is obtained in Table 4, using formula (EQ7) mentioned above.

Table 4: Deviation Sequence

Sr No.	Country	Startup skills	Opportunity startup	Product innovation	Process innovation
0	Reference sequence	1.000	1.000	1.000	1.000
1	Chile	0.061	0.015	0.000	0.664
2	Lithuania	0.414	0.155	0.305	0.457
…..	…….	……	……	……..	……
…..	…….	…….	……	……..	……
54	Senegal	0.853	0.881	0.981	0.595
55	Libya	0.506	0.610	0.866	0.927
…..	……..	……	……..	……	……..
…..	……..	……	…….	……	……..
86	Mauritania	0.967	0.956	0.920	0.915
87	Chad	0.979	0.947	0.884	0.913

In the fifth step grey relation coefficient (Table 5) is obtained using formula mentioned above based on normalized matrix. The value of grey relational coefficient as per literature is 0.5.

Table 5: GRA Coefficient

Sr No.	Country	Startup skills	Opportunity startup	Product innovation	Process innovation
0	Reference sequence	1.000	1.000	1.000	1.000
1	Chile	0.891	0.970	1.000	0.430
2	Lithuania	0.547	0.763	0.621	0.522
…..	……	……..	……	……	……..

…..	……	……..	……	……	……..
54	Senegal	0.370	0.362	0.338	0.457
55	Libya	0.497	0.451	0.366	0.350
…..	……..	……..	……..	……	……..
…..	……	……..	……	……	……
86	Mauritania	0.341	0.344	0.352	0.353
87	Chad	0.338	0.346	0.361	0.354

The next step is obtaining GR grades as portrayed in Table 5.

Table 6: GR Grade

Sr No.	Countries	GR grade
1	Chile	0.8227
2	Lithuania	0.6133
….	……..	…….
….	……..	…….
54	Senegal	0.3816
55	Libya	0.4159
….	……..	…….
….	……..	…….
86	Mauritania	0.3474
87	Chad	0.3497

Table 7 is illustrating the last step of GRA is to generate purposed ranking on the basis on GR grades given below:

Table 7: Purposed Ranking

Sr No.	Countries	GR grade
1	Chile	0.8227
2	Turkey	0.6914
….	……..	…….
….	……..	…….
54	Paraguay	0.3970
55	Pakistan	0.3967
….	……..	…….

….	……..	…….
86	Chad	0.3457
87	Mauritania	0.3474

Result

According to purposed ranking 1st country remains same and remaining countries subject to changes. Based on Grey relational grades, the scheme of grouping countries under different ensigns are attained in Table 8. The method of ensigns has been established based on an ordinal scale, which comprises much better, better, somewhat better, fair, poor, somewhat worse, and worse(Qazi, Shaukat, Niazi, & Basit, 2021).

Table 8: Arrangement of Countries Categorized by GRA and Assigned Ensigns

Sr No.	Ensign	Description
1	Much better	Countries having GR grade ranging from 0.8227 to 0.5702 are measured as having an excellent entrepreneurial environment and economic growth
2	Better	Countries having GR grade ranging from 0.5487 to 0.4837 are measured as having a very good entrepreneurial environment and economic growth
3	Somewhat better	Countries having GR grade ranging from 0.4860 to 0.4405 are measured as having a good entrepreneurial environment and economic growth
4	Fair	Countries having GR grade ranging from 0.4388 to 0.4057 are measured as having a reasonable entrepreneurial environment and economic growth
5	Poor	Countries having GR grade ranging0.4029 to 0.3899 from are measured as having a weak entrepreneurial environment and economic growth
6	Somewhat worse	Countries having GR grade ranging from 003894 to 0.3749 are measured as having a very weak entrepreneurial environment and economic growth
7	Worse	Countries having GR grade ranging from 0.3700 to 0.3474

		are measured as having a worst entrepreneurial environment and economic growth	

No nation can ignore the importance of entrepreneurship since it is a key driver of economic expansion. Innovation, the creation of jobs, and the growth of wealth are all fueled by entrepreneurs. It is crucial to evaluate and rank countries according to their entrepreneurial environments as they work to create an atmosphere that supports entrepreneurial endeavors. Table 9 presents the intended ranking, providing a thorough summary of the assessed data and emphasizing the relative scores that are being considered. which seven countries have been classified using the ensign technique. Economic development and the entrepreneurial climate are deemed to be "Much Better" in countries ranked 1 through 12.

Table 9: Results of Grey Relational Analysis

Proposed Ranking			
Much better			
	1	Chile	0.8227
	2	Turkey	0.6914
	3	Malaysia	0.6574
	4	China	0.6515
	5	Latvia	0.6331
	6	Lithuania	0.6133
	7	India	0.6079
	8	Serbia	0.5935
	9	Lebanon	0.5930
	10	Jordan	0.5848
	11	Morocco	0.5785
	12	Tunisia	0.5702
Better			
	13	Namibia	0.5487
	14	Guatemala	0.5381
	15	Sri Lanka	0.5314
	16	Montenegro	0.5281

	17	Costa Rica	0.5259
	18	Philippines	0.5220
	19	Uruguay	0.5104
	20	South Africa	0.5000
	21	Colombia	0.4962
	22	Bulgaria	0.4884
	23	Romania	0.4860
	24	Azerbaijan	0.4840
	25	Ukraine	0.4837
Somewhat better			
	26	Argentina	0.4806
	27	Honduras	0.4805
	28	Thailand	0.4792
	29	Panama	0.4720
	30	Venezuela	0.4581
	31	Indonesia	0.4537
	32	Albania	0.4499
	33	Peru	0.4479
	34	Bolivia	0.4444
	35	Kazakhstan	0.4417
	36	Dominican Republic	0.4416
	37	Ethiopia	0.4405
	38	Botswana	0.4388
Fair			
	39	Nicaragua	0.4341
	40	Ecuador	0.4303
	41	Cambodia	0.4247
	42	Belize	0.4224
	43	Mexico	0.4221
	44	Vietnam	0.4180
	45	Gabon	0.4174

	46	Libya	0.4159
	47	Malawi	0.4146
	48	Moldova	0.4126
	49	Lao PDR	0.4079
	50	Ghana	0.4057
	51	Jamaica	0.4029
Poor			
	52	Kenya	0.4013
	53	Swaziland	0.3984
	54	Rwanda	0.3970
	55	Paraguay	0.3970
	56	Pakistan	0.3967
	57	Algeria	0.3962
	58	Tajikistan	0.3955
	59	Kyrgyz Republic	0.3954
	60	Armenia	0.3949
	61	Zambia	0.3925
	62	Georgia	0.3923
	63	Uganda	0.3899
	64	Suriname	0.3894
Somewhat worse			
	65	Brazil	0.3874
	66	Tanzania	0.3863
	67	Guyana	0.3851
	68	Bangladesh	0.3830
	69	Senegal	0.3816
	70	Myanmar	0.3807
	71	Mozambique	0.3802
	72	Mali	0.3792
	73	Bosnia and Herzegovina	0.3780
	74	Nigeria	0.3760

	75	Madagascar	0.3759
	76	Côte d'Ivoire	0.3749
	77	El Salvador	0.3725
Worse			
	78	Angola	0.3700
	79	Burundi	0.3699
	80	Cameroon	0.3698
	81	Burkina Faso	0.3695
	82	Liberia	0.3685
	83	Sierra Leone	0.3657
	84	Guinea	0.3622
	85	Benin	0.3598
	86	Chad	0.3497
	87	Mauritania	0.3474

Discussion

Despite the critical role of entrepreneurship on national prosperity, there has been a noticeable scarcity of comprehensive research in this regard. This knowledge gap has hindered the ability to make informed decisions and implement effective policies. Recognizing the void, the present study endeavors to contribute to the field of entrepreneurship research by conducting a thorough investigation into the factors that shape a country's entrepreneurial landscape. The primary objective of this study is to develop a context that assesses and compares the entrepreneurial environments of various developing countries. To achieve this, the study employs four key indicators: startup skills, opportunity startup, process innovation and product innovation these indicators have been carefully selected to provide a comprehensive evaluation of a country's entrepreneurial environment and economic growth along with the influence of these indicators on EE and EG.

All countries have been ranked using GRA, which has been divided in seven groups on the ensign method which includes, much better, better, somewhat better, fair, poor, somewhat worse, and worse. Finding showed that country ranked from 1 to 12 having grey relational grade 0.8227 to 0.5702 are considered to have much better entrepreneurial environment and economic growth. In this group, the top

country is Chile, and the last country is Tunisia. The people in these countries have much advanced startup skills and favorable opportunity startup setting along with effective and efficient process and product innovation. Next, the countries ranked from 13 to 25 having grey relational grade 0.5487 to 0.4837 are “Better”. Which means these countries are very good entrepreneurial environment and economic growth. The first country in this group Namibia having 0.5487 and the last country is Ukraine having 0.4837 GR grade. Next, the countries ranked from 26 to 38 having grey relational grade 0.4806 to 0.4388 are “Somewhat better”, Which means these countries are good entrepreneurial environment and economic growth viewpoint. The first country in this group is Argentina and the last is Botswana. Succeeding, the countries ranked from 39 to 51 having grey relational grade 0.4341 to 0.4029 are “fair”, that means these countries have reasonable entrepreneurial environment and economic growth. The first country in this group is Nicaragua having 0.4341 and the last is Jamaica having 0.4029 GR grade. Next, the countries ranked from 52 to 64 having grey relational grade 0.4013 to 0.3894 are “poor”, that mean these countries have week entrepreneurial environment and economic growth. The first country in this group is Kenya having 0.4013 GR grade and last is Suriname having 0.3894 GR grade. Next, the countries ranked from 65 to 77 having grey relational grade 0.3847 to 0.3725 are “somewhat worse, that means these countries have very week entrepreneurial environment and economic growth. The first county in this group is Brazil and the last country is El Salvador. Lastly, the countries ranked from 78 to 87 having grey relational grade 0.3700 to 0.3474 are “worse”. The first country in this group is Angola having 0.3700 GR grade and the last country is Mauritian having 0.3474 GR grade. These countries have the worst entrepreneurial environment and economic growth.

Startup skills are critical for creating a superlative entrepreneurial environment because they equip individuals with the necessary tools and mentality to navigate the challenges and difficulties of starting and increasing a new business. Here are some reasons why these skills are driving sustainable economic development. These skills operate in energetic and indeterminate environments. The ability to adapt quickly to changing circumstances is vital for success. These skills foster flexibility, enabling businesspersons to pivot their approaches, make informed

decisions, and respond effectively to market changes. This faces numerous challenges, fluctuating from product development to market entry and scaling. Strong problem-solving skills are essential for recognizing and addressing these challenges effectively. Entrepreneurs with well-honed problem-solving abilities can find innovative solutions and overcome problems along their entrepreneurial journey. Entrepreneurship is often categorized by ups and downs. These skills may face setbacks, rejections, and failures. Flexibility is the capacity to bounce back from these setbacks, learn from them, and keep moving forward. Evolving resilience through startup skills helps entrepreneurs circumnavigate through difficult times, persevere in face of difficulty, and ultimately achieve success. Startups thrive on creativity and innovation. By acquiring and honing startup skills, entrepreneurs can improve their chance of success, build robust businesses, and contribute to a thriving entrepreneurial environment. Moreover, the increasing effect of startup with strong kills sets creates a superlative entrepreneurial environment, encouragement innovation, job creation, economic growth, and societal development. By fostering an encouraging environment for startup skills development, such as providing access to training program, mentorship opportunities and financial resources, countries can create an entrepreneurial environment that attracts and nurtures skilled entrepreneurs. This in turn, leads to a confident impact on economic growth, innovation, job creation, and overall societal progress.

An opportunity startup refers to the establishment of a new business project based on the identification and exploitation of a specific market gap, unmet need, or untapped opportunity. It includes recognizing a potential business impression or concept that has the potential of success and pursuing its development into a viable and ascendable enterprise. The core characteristic of an opportunity startup is the recognition and pursuit of a business opportunity that offers the potential for innovation, growth, and profitability. Opportunity startup are projects initiated to capitalize on identified market gaps, unmet needs, or untapped opportunities. These startups play a vital role in driving entrepreneurial activities within developing economies. Here's a brief note on opportunity startups and their effect on entrepreneurial activities within developing economies. It refers to the creation of new businesses based on identifying and manipulating market opportunities. These

ventures typically offer innovative products, service, or business models to address customer desires or solve specific problems. In developing economics, opportunity startups have significance impacts it contributes to economic growth by introducing new businesses industries. They create employment opportunities, create income, and stimulate economic activity, eventually leading to improved living standards and reduced poverty. Moreover, it drives innovation and technological advancement within development economic. These ventures often bring fresh concepts, introducing new technologies and disrupt existing markets. By challenging traditional methods that bring innovation promote creativity and foster a culture of entrepreneurial environment within development economies. They attract attention, resources, and support from various shareholders such as investors, mentors, incubators, and government agencies. This helps develop a helpful environment that nurtures entrepreneurship, facilitates knowledge sharing and creates a network of association and support. Opportunity startups familiarize competition into existing markets, encouraging established firm to improve their products, services, and operative efficiency. This leads to enhanced competitiveness, increased consumer choice, improved quality, and lower prices. Market competition powered by opportunity startup drives overall economic efficiency. It has a significant social impact within emerging economic. By creating an enabling environment, developing economic can influence opportunity startup to drive economic growth foster innovation and create supportable development pathways.

Product innovation has a profound influence on economic growth within developing countries. This is enhancing the competitiveness of production and businesses in developing countries. It allows businesses to add value to their offering, leading to higher profit margin. Developing countries often rely on the expert of raw material or low-value-added goods. Through production innovation, these countries can move up the value chain, develop higher-value products, and detention the larger share of the economic value produced along the production process. By fostering a culture of innovation and supporting product innovation efforts, devolving countries can unlock their economic potential and achieve maintainable growth. Product innovation within specific industries can have spillover effects and create linkages across the economy. As businesses innovate and develop new

products, they often require input from other industries or sectors, creating opportunities for suppliers, service providers and supporting industries to grow. This arouses industrial connections and raises a more interconnected and dynamic economy, leading to sustained economic growth.

Process innovation has a significant impact on economic evolution within developing countries. This involves finding new and more efficient ways to produce possessions or deliver services. By optimizing production processes, reducing waste, improving resource consumption, and streamlining operations, businesses can enhance their efficiency and productivity. This leads to cost savings, higher output levels and increased competitiveness, driving economic growth within developing countries. It often results in cost reduction, making products or services more reasonable and accessible to an extensive population. This can have a positive impact on living standards, as essential goods and services become more affordable for the customer. Condensed costs can also attract domestic and international investment, spur entrepreneurship and stimulate overall economic activity. Process innovation can lead to improved product or service quality. By applying quality control measures, adopting new technologies and enhancing production procedures, businesses can deliver higher-quality outputs. This can result in increased customer consummation, stronger market demand and improved competitiveness in both domestic and international markets. By embracing process innovation, developing countries can enhance their economic competitiveness, achieve higher productivity levels, and pave the way for sustainable and inclusive growth.

Table 10: Contrasting Results of Study with Some Studies of Existing Literature

Sr No	Studies	Title	Variable/indicators	Methodology	Results
1	Current study	Ranking of developing countries; an entrepreneurship and economic growth	Startup skill, opportunity startup, process innovation and product innovation	Grey relational analysis	87 developing countries are ranked where Chile is on

		viewpoint			the top and Mauritian in on the Bottom.
2	Ertuğrul, et al. (2016)	Ranking of Turkish universities on the basis of performance indicators	Total articles, total citations, total documents, PHD students, Lecturers / Student Ratio	Grey relational analysis	There was a clear difference found between purposed and original ranking of universities
3	Qazi et al. (2021b)	Ranking of countries on the basis of their health system after COVID-19	Total infections by COVID-19, total deaths by COVID-1, total active cases by COVID-19etc.	Grey relational analysis	Pakistan was found to have poor health` system.
4	Zhu et al., 2022)	Grey relational analysis of country level entrepreneurial environment; a study of selected forty-eight countries	Number of patent applications, number of trademark applications, new business registered, and time required to start a business	Grey relational analysis	48 countries were ranked, US was ranked on the top and Namibia was on bottom.

The results of the current study exhibit noteworthy contrasts when compared to certain studies from existing literature. The differences can be attributed to variations of number of variables considered, the allocation of weights to each variable, and the selection of alternatives within dataset. Such discrepancies can significantly impact the outcomes and interpretations. Additionally, the choice of methodology may also contribute to divergent results. While findings highlight distinct perspectives and outcomes, they collectively contribute to the growing body of knowledge in this field (Table 9).

Conclusion and Future Recommendations

Over the past three decades, entrepreneurship has emerged as a significant phenomenon. It's capacity to generate wealth and employment has attached considerable interest. It is widely recognizing; economic growth pertains to regional and national economic system. Entrepreneurship is closely linked with innovation, underscoring the importance of creative and integrative thinking in contemporary business environment (İskender & Batı, 2015). This study sheds light on the paramount importance of entrepreneurship as a driving force behind entrepreneurial environment and economic growth, underscoring its undeniable significance in shaping the density of nations. To fully realize the potential of entrepreneurship. It is mandatory upon us to meticulously evaluate, and benchmark countries based on the health of their entrepreneurial environment and economic growth. A research is has been taken out in which researchers used Grey relational analysis applied on 48 countries to investigate country level entrepreneurial environment, which shows US, Japan, Australia, Hong Kong SAR, France and Canada attained highest rank whereas Poland, Kuwait, Namibia and so on attained lowest GR grades and measure entrepreneurial environment on the basis of this ranking (Zhu et al., 2022). This research has undertaken this task by utilizing a robust framework of four critical indicators, providing a comprehensive assessment of nation's entrepreneurial environment and economic growth. A clear depiction is provided though a valuable ranking which shows countries from 1 to 12 having 0.8227 to 0.5702 GR grades are known as Chile and Tunisia have 'Much better" Entrepreneurial environment and economic growth. Countries from 13 to 25 having 0.5487 to 0.4837 GR grades are known as Namibia and Ukraine have "Better"

entrepreneurial environment and economic growth. Countries from 26 to 38 having 0.4806 to 0.4388 are known as Argentina and Botswana have “Somewhat better” entrepreneurial environment and economic growth viewpoint. Likewise, countries from 39 to 51 having GR grade 0.4341 to 0.4029 are known as Nicaragua and Jamaica have “Fair” entrepreneurial environment and economic growth viewpoint. Countries from 52 to 64 are known as Kenya and Suriname having 0.4013 to 0.3894 are considered as “Poor” and countries from 65 to 68 having 0.3874 to 0.3830 GR grades are known as Brazil and Bangladesh which has “Somewhat worse” Entrepreneurial environment and economic growth point. This study leverages the Grey relational analysis method to rank developing countries based on their entrepreneurial environment and economic growth perspectives. Providing a view that considers the interplay of various factors. While GRA has yielded valuable insights, it is essential to recognize the inherent limitations and the implications of findings.

Furthermore, this study delves into the constructs including startup skills, opportunity startup, process and product innovation exploring their influence of entrepreneurial environment and economic growth. However, this study has many limitations that warrant acknowledgement and avenues for future exploration. This study serves as a steppingstone towards a deeper comprehension of its multifaceted influence. By addressing its limitations and building upon its findings, we can continue to refine our approaches, foresting a world where entrepreneurship thrives and people societies toward greater prosperity.

Theocratical Implications

The study's application of the Global Entrepreneurship Index (GEI) and Grey Relational Analysis (GRA) provides a solid framework for analyzing and comprehending the entrepreneurial climate and its impact on economic growth in emerging countries. Incorporating theoretical implications into the broader debate on entrepreneurship and economic development will help us better comprehend the complicated linkages between entrepreneurial environment and economic growth, particularly in developing nations. The application of the GEI emphasizes the diverse character of entrepreneurship. It implies that entrepreneurship should not be regarded as a single, isolated variable, but rather as a synthesis of multiple aspects

and dimensions such as opportunity perception, startup skills, risk perception, and invention. This multifaceted approach should be incorporated into entrepreneurship theoretical models. GRA enables the study of linkages and patterns in a complex and dynamic environment. According to the study's findings, the entrepreneurial environment is influenced by contextual factors that differ across developing nations. This indicates that entrepreneurship theories must consider the role of context-specific variables in explaining entrepreneurial behavior and outcomes. The findings of the study largely resonate with established theories regarding the influence of entrepreneurial environments on economic growth within developing countries. Specifically, the correlation between innovations indicators (process and product innovation) and economic progress aligns with existing literature emphasizing the importance of innovation in foresting economic growth. These outcomes substantiate the belief that foresting supportive environment for startups positively impacts a nation’s economic trajectory. GRA's ability to capture dynamic relationships implies that entrepreneurship is an ever-evolving phenomenon influenced by changing conditions and interactions. The use of GEI and GRA as analytical tools in this study may also have theoretical implications for methodological approaches in entrepreneurship research. It suggests that researchers should consider employing multidimensional indices and advanced analytical techniques to better understand the complexity of entrepreneurship. The study most likely emphasizes the value of cross-cultural and comparative entrepreneurship studies. The theoretical conclusion here is that entrepreneurship theories and models should be adaptable and usable across many cultural and economic situations, and researchers should strive for a more global viewpoint in their study.

There are few practical implications for various stakeholders of this research. By ranking and assessing the entrepreneurial environment of different developing countries, the study may suggest that policymakers should consider tailoring their strategies to the specific needs and challenges of their country. This implies that one-size-fits-all policies may not be effective in promoting entrepreneurship and economic growth. This research can be utilized by entrepreneurial aspirants to identify potential markets with higher growth opportunities. This research will help

entrepreneurial aspirants for resource allocation. This ranking can assist them in determining where to allocate their resources. Countries with higher rankings may offer better access of funding, skilled labor and infrastructure with increases the chances of success. Researchers can build on the findings of this research to conduct more in-depth studies on specific developing countries or explore the specific drivers that contribute to their entrepreneurial environment and economic growth performance. This research will help entrepreneurial firms in strategies expansion and risk assessment. Established entrepreneurial firms seeking international expansion can use this ranking to identify favorable markets with untapped potential. It can aid in making informed decisions about where to invest and establish operations. Policy makers can use this research in policy formulation and identifying best practices. This ranking can serve as a reference for policy makers to understand their country's relative performance and benchmark it against others. Additionally, by analyzing higher ranked countries, policy makers can identify best practices and policy approaches that have contributed to their success. These lessons can be adapted and implemented in lower ranked countries to improve their entrepreneurial systems.

Indicators selected for this research are very specific. Relevant indicators have been chosen that truly represent entrepreneurial environment and economic growth. There are many other indicators available for research. From various types of multi-criteria techniques, Grey relational analysis is used for this research, using the data set of 2018. The availability of data points for different countries may differ in terms of timing. GRA is generally static and does not capture the dynamic nature of entrepreneurial environment and economic growth viewpoint. Longitudinal analysis may provide more insights into the trends and changes in ranking over time. There are several multi criteria techniques which could be consider for this research to obtain comprehensive perspective. Only developing countries are selected in this research to analyze their entrepreneurial environment and economic growth.

Future Recommendations

There is a wide array of indicators available for researchers to explore entrepreneurship-based research, researchers can harness the power of those diverse indicators to delve deeper into the world of entrepreneurship. Developing

countries are used in this research to study entrepreneurial environment and economic growth. Developed countries can be selected to study subjects. In the realm of research methodologies, Gray relational analysis has been used in this research. There are various multi criteria techniques which can be used in future study. Looking ahead, Dataset onwards from 2018 and onward represents a valuable resource for investigating entrepreneurial environment and economic growth. These more recent datasets can capture the dynamics of entrepreneurship in a rapidly evolving global landscape, providing fresh insights into dynamic fields. As researchers seek to gain a deeper understanding of entrepreneurship in the post-COVID 19 era, they can focus on studying its impacts on both developing and developed countries. The pandemic has reshaped the entrepreneurial landscape in profound ways, and its consequences offer a unique opportunity to assess how entrepreneurship can drive recovery and resilience in diverse economic context.

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