

CHILE GEI INDEX: A COMPARATIVE STUDY IN LATIN AMERICA/CARRIBBEAN

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Abstract : Entrepreneurship, widely acknowledged as pivotal for economic development, has spurred global interest among policymakers, prompting the formulation of policies aimed at fostering entrepreneurial activities. Entrepreneurs, driven by vision, innovate products, processes, and services, thereby stimulating economic growth, creating employment opportunities, and bridging the gap between invention and commercialization. As economies seek ways to accelerate employment and enhance productivity, entrepreneurship emerges as a potential solution, particularly for those grappling with prolonged economic crises. To better understand and improve entrepreneurial landscapes, scholars have developed measurement methods, with the Global Entrepreneurship Index (GEI) standing out as a comprehensive model. By blending entrepreneurship with institutional factors, GEI offers insights into a country's entrepreneurial ecosystem. It comprises three sub-indexes, each reflecting entrepreneurial attitudes, abilities, and aspirations, supported by 14 pillars and 28 variables. GEI recommends five levels of index building to gauge entrepreneurship at the national level.

This study focuses on Chile's entrepreneurship profile, utilizing world data from GEI that available spanning 2015 to 2017. Chile, positioned 15th in the World GEI Index during this period, stands out as the only representative from South America/Latin America/Caribbean countries. Despite its economic strength and numerous trade agreements, Chile has room for improvement to bolster its regional standing. Entrepreneurship measurement methods encompass quantitative and qualitative approaches. While quantitative methods offer statistical insights, they may lack depth in understanding entrepreneurship's broader impact. Qualitative methods, in contrast, delve deeper into the correlation between entrepreneurship and economic development, emphasizing opportunity-driven entrepreneurship and innovation. GEI methodology offers a unique perspective, integrating institutional and cultural dimensions to assess entrepreneurship's role in economic development. Notably, GEI highlights the importance of addressing bottlenecks within entrepreneurial ecosystems, wherein the lowest-performing pillars impede overall progress. The Triple-A structure of GEI encompasses entrepreneurial attitudes, abilities, and aspirations, underpinned by 14 pillars reflecting both individual and institutional variables.

Keywords : Global Entrepreneurship Index, entrepreneurship, development, qualitative

INTRODUCTION

Many scholars have confirmed that entrepreneurship activities are pivotal for

economic development (Acs et al., 2014).

Entrepreneurs contribute as the stimulant of economic growth and the source of new

employment (Calza and Goedhuys, 2016; Acs et al., 2016). This perception creates a wave worldwide for the policy-makers to compose some sets of policies to encourage the increasing number of entrepreneurships. Entrepreneurs are the people with visions that create innovative products, processes, and services and bring them to the market (Schumpeter, 1934). Entrepreneurs connect invention and commercialization (Acs et al., 2020) that generate income at an accumulative level, and considered as a possible way to speed up the employment most in the younger generation and to increase the productivity for advanced economies that experience slow recovery from a prolonged economic crisis (Calza and Goedhuys, 2016). Analyzing and measuring the entrepreneurship aspect can provide better insight into a country's entrepreneurial situation and provide methods to improve it.

The Global Entrepreneurship Index (GEI) is one of the most comprehensive models that blends entrepreneurship or current business creation with institutional factors (Szerb and Turnbull, 2018). This measurement analyzes institutional aspects and individual capabilities in entrepreneurship (Szerb et al., 2016). GEI consists of three sub-indexes (attitudes, abilities, and aspirations), 14 pillars which each pillar contains an individual and institutional variable component), 28 variables, and 49 indicators (Szerb et al., 2016). GEI recommends five levels of index building to measure entrepreneurship at a country level.

Based on this, the purposes of this study are to examine Chile's profile in the development and entrepreneurship profile by studying and analyzing the dataset material from GEI year 2015 to 2017. This research favors Chile as the chosen country

because of its economic development and growth. It is interesting that Chile is in position number 15 according to the World GEI Index 2015-2017 and is the only country from South America/Latin America/Caribbean countries. Amoros et al., (2016) confirm that Chile would be an attractive case as one of the economies with the highest levels of development in Latin America, and its small open economy with 22 trade agreements with 60 countries that speak for a total of 85% overall of GDP of the world. As the only country in Latin America and South America that outcome China, Chile was impressed with its economic strength. However, there should be room for Chile for improvement to strengthen the country's position in the region. As suggested setup, this study separates into some sections. It starts with the concept of the GEI method, entrepreneurship development of Chile, Chile's triple-A subindexes, the penalty for bottleneck approach, policy actions, recommendation, and closed with a conclusion.

LITERATURE REVIEW

Entrepreneurships Measurement Methods

There are two types of entrepreneurship measurements; quantity types of entrepreneurial activity and quality aspects of entrepreneurship (Szerb et al., 2016). The quantitative types are classified into three categories to measure entrepreneurship in a country. Those three categories are output, attitude, and framework measurements. Each measurement suggests diverse country-level entrepreneurship concepts and intertwines each other, and even some of the approaches appear in all of them (Ács et al., 2014). Output measurement treats entrepreneurship as new ventures creation

or self-employment new entrance. One of the most popular measurements in this output is the Global Entrepreneurship Monitor (GEM). This method collects the self-employed or new-born entrepreneurs who transform into business managers (recognized as TEA, total-early activity). GEM gathers the information through a population survey in various countries since 1999. Other output measures collect the data through a nation's statistics information databases. The samples for these measurements are the World Bank Entrepreneurship Survey to trace new business creation and OECD Self Employment Rate, which uses numerous national databases to calculate nationals' high growth business (Acs et al., 2014). Attitude measures include data compilation of the attitudes, values, and opinions useful for entrepreneurship. In addition to the output measure above, GEM also supplies information about entrepreneurial spirits, opportunities, self-perceptions, intentions, and capabilities (Acs et al., 2016).

Framework measurements collect the information about the general conditions of entrepreneurial frameworks in a country (such as the population's educational level, quality of entrepreneurship policy interventions and regulation, and the resources for entrepreneurship availability) and cultivate to capture formal institutions (Ács et al., 2014; Autio et al., 2020). Besides GEM that conducts the surveys to collect information about a country's entrepreneurial framework, the World Bank Ease of Doing Business also contains the regulatory framework that supports the organization's registration. The OECD Entrepreneurship Indicator Program also covers the environment framework, economic effects, and entrepreneurship functioning (Acs et al., 2014).

Although quantitative approaches provide good information statistically, the weakness of this method is the lack of correct conclusions based on the provided data (Szerb et al., 2016). The results are too narrow, and the policy-makers can boost only the number of organizations instead of supporting the general innovative process. Additionally, it cannot measure the overall substance of entrepreneurship (Acs et al., 2014). On the contrary, qualitative methods provide in-depth analysis better to understand the correlation between entrepreneurship and economic development. This method also focuses on the opportunity-driven entrepreneurship to economic growth, generate a higher level of success, higher rate, better job employment rate, and more innovation (Acs et al., 2017).

METHODOLOGY

Global Entrepreneurship Index (GEI) Methodology: Concept, Theory, and Structure

Global Entrepreneurship Index (GEI) aims to cater the entrepreneurship measures based on a comprehensive theory-based that describes the entrepreneurship roles on economic development (Acs et al., 2019). This methodology completes the institutional cultural dimensions at a macro level, regulation, infrastructure, education, financial institutions, market size, and human capital (Szerb and Trumbull, 2018). GEI methods gained wider acknowledgment when the Global Entrepreneurship Network used GEI as their official index for their institution in 2014 instead of GEM.

GEI method consists of a unique character as the system of entrepreneurship view. The special feature of the GEI index is that the value of the GEI is more affected

by the pillars with the lowest values rather than by the ones with higher values. The posts with the worst value will be the bottleneck that intervenes with other ones. Thus, the better-performing pillars cannot be maximum when there is a disbalance. The penalty size will determine the magnitude of the bottleneck. The higher the gap between a particular pillar and the bottleneck pillar; thus, the penalty will be higher (Szerb and Trumbull, 2018). GEI consists of a multilevel structure that composes three sub-indexes. These three sub-indexes or building blocks are entrepreneurial attitudes, entrepreneurial ability, and entrepreneurial aspiration. It is commonly known as Triple-A (Acs et al., 2020). Moreover, the Triple-A upholds 14 pillars, which, all sub-indices contain an individual and institutional variable that coincides with aspects of entrepreneurship at the micro and the macro-level (Acs et al., 2020). The structures of GEI method are as seen in the table below:.

Sub-index	Pillar	Variable (Ind./Inst.)
ATTITUDES SUB-INDEX	OPPORTUNITY PERCEPTION	OPPORTUNITY RECOGNITION FREEDOM (ECONOMIC FREEDOM *PROPERTY RIGHTS)
	STARTUP SKILLS	SKILL RECOGNITION EDUCATION (TERTIARY EDUCATION*QUALITY OF EDUCATION)
	RISK ACCEPTANCE	RISK RECOGNITION COUNTRY RISK
	NETWORKING	KNOW ENTREPRENEUR ASSOCIATION (ORGANIZATION*INFRASTRUCTURE)
	CAREER STATUS	CAREER STATUS CORRUPTION
	CULTURAL SUPPORT	OPPORTUNITY RECOGNITION GOVERNANCE (TAXATION*GOOD GOVERNANCE)
ABILITIES SUB-INDEX	TECHNOLOGY ADOPTION	TECHNOLOGY LEVEL TECHNOLOGY ADOPTION
	HUMAN CAPITAL	EDUCATIONAL LEVEL LABOR MARKET (START TRAINING*LABOR FREEDOM)
	COMPETITION	COMPETITION COMPETITIVENESS (MARKET DOMINANCE**REGULATION)
	PRODUCT INNOVATION	NEW PRODUCT TECH TRANSFER NEW TECHNOLOGY
ASPIRATION SUB-INDEX	PROCESS INNOVATION	SCIENCE (GERD**INTRA SECTORIALITY OF SCIENTIFIC INSTITUTIONS AVAILABILITY OF SCIENTISTS AND ENGINEERS)
	HIGH GROWTH	SCALEUP FINANCE AND STRATEGIC (VENTURE CAPITAL*BUSINESS SOPHISTICATION)
	INTERNATIONALIZATION	EXPORT ECONOMIC COMPLEXITY
	RISK CAPITAL	INFORMAL INVESTMENT DEPTH OF CAPITAL MARKET

*Individual variables are colored with white background while institutional ones with light blue background.

Figure 1. The new structure of the Global Entrepreneurship Index (GEI)
Sources: Acs et al., (2020: 26)

GEI allows calibrating entrepreneurship in various ways by using the concept of Entrepreneurship Ecosystem (EE) (Szerb and Trumbull, 2018; Stam, 2015;

Acs et al., 2014). EE pursuits entrepreneurial opportunity towards productive uses by allocating financial, human, and material resources, which are also a key enabler of a country's digital economy (Acs et al., 2014). EE also configures and organizes economic activity within geographical space, and the entrepreneurship roles bring to life. Stam (2015) claimed that the approach for entrepreneurial ecosystem would be best when it starts from the Individual and not Institutions.

The EE approach has three significant reasons for measuring entrepreneurship within the country. Those three reasons are: firstly, EE complies with entrepreneurial activity as an intermediate output that is developing out of the EE. EE separates entrepreneurial activity, entrepreneurship system, and entrepreneurial outcomes. Second, EE separates self-employment with other entrepreneurial output measures such as innovation orientation and start-ups' ambitiousness, prioritizing the latter ventures' types. The third is EE considers entrepreneurial ecosystem elements as constituents' actors (Szerb and Trumbull, 2018). The structure of entrepreneurial ecosystems is in below figure:



Figure 2. The Entrepreneurial Ecosystem Configuration Structure
Source: Szerb et al., (2020: 3)

Entrepreneurs must have knowledge, skills, and motivation. These elements initiate them to allocate their internal and external resources through the dynamic process of trial and error during the building of the new ventures (Szerb and Trumbull, 2018). The entrepreneurial framework conditions are essential because they regulate those who choose to be entrepreneurs. Second, to the extent that creating new business can fulfill their growth potential. The entrepreneurial choice is mainly affected by benign framework conditions (social norms and culture). The second aspect is affected by a range of entrepreneurial framework conditions (research and development, education, government, financial sector, corporate sector, and infrastructure).

RESULT AND DISCUSSION

Entrepreneurship Development Performance of Chile

Based on the ECLAC report in 2011, the military regime of Pinochet created Chile's national strategy for 35 years. During the 2010s, the conservative new government was elected, which rolled back the new industrial policies many years around (Devlin and Mogueillansky, 2011). However, Chile has performed stability until a decade later and became the best Latin American country. Their income per capita grew twice for more than two decades and is considered the highest economy in Latin America. Chile is an exclusive example of Latin America's economic development and performs an outstanding in terms of entrepreneurs' ecosystems progress and growth of entrepreneurial activity (Torres Marín et al., 2021). Chile also enjoys a robust macroeconomic framework and institutions that encourage investment (OECD report,

2019). The summary of Chile's economic performance can be observed from the table below. From these world-leading performance indicators: Human Development Index, Global Innovative Index, and Corruption Perception Index, Chile's position was always above half of the surveyed countries.

Table 1. Summary of Chile Economic Performance Statistics

Source: Author's works

INDICATORS in 2019	SOURCES	VALUE	RANK	OUT OF COUNTRY
Human Development Index	UNDP	0.851	43	189
Global Innovative Index	WIPO	33.86	34	179
Corruption Perception Index	Transparency	67	26	179
Population 2020	World Bank	19.2 million people		

From Figure 1 below, Chile ranked

3 in the TEA 2015-2017 with a score of 20.98. It implies that the behavior of percentage of population 18-64-year-old in Chile that choose to be the entrepreneurs or the manager of the new business as their career options is high.

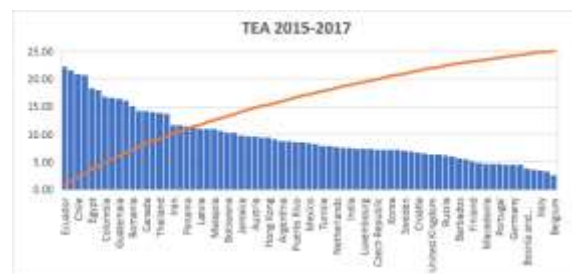


Figure 3. Country's TEA Rate 2015-2017

Source: GEI data sheet 2006-2017

The available data set of GEI 2015-2017 datasheet in Figure 4 shows that Chile ranks number 17 for GEI with 58.5 from 73 observed countries. Chile is in the stage-2 economy country (efficiency-driven economy) with other Latin America/Caribbean countries, except Puerto Rico (in the stage-3 economy country or innovation-driven economy).

Rank	Country	GDP 2015.3T	GEI	DEV.	Rank	Country	GDP 2015.3T	GEI	DEV.
1	United States	55541	84.4	3	35	Turkey	20704	30.6	2
2	Switzerland	47049	80.0	3	36	Hungary	29228	30.6	2
3	Canada	43889	79.2	3	40	Russia	25756	30.6	2
4	UK	39331	79.4	3	41	Colombia	23329	30.4	2
5	Australia	43399	73.7	3	42	Greece	24819	32.9	2
6	Sweden	46599	72.7	3	43	Malaysia	25620	33.9	2
7	Denmark	49794	71.6	3	44	Belgium	33484	34.8	2
8	Netherlands	47912	69.2	3	45	Holanda	35287	34.7	1
9	France	36334	67.7	3	46	Costa	11018	31.6	2
10	Finland	30320	67.4	3	47	Strany	20380	33.2	2
11	Hong Kong	34813	67.3	3	48	South Africa	22329	32.3	2
12	Austria	41881	69.8	3	49	Slovenia	23679	31.2	1
13	Germany	43333	69.8	3	50	Denmark	33928	33.4	2
14	Israel	32019	64.3	3	51	Mexico	22440	28.0	2
15	Belgium	41708	63.8	3	52	Monaco	7586	47.7	2
16	Taiwan	49450	60.8	3	53	Para	12100	27.6	2
17	Chile	31933	58.25	2	54	Dominica	17790	21.0	2
18	Latvia	21881	58.2	3	55	Poland	23308	26.4	2
19	Denmark	46008	57.8	3	56	Monaco	7510	38.4	2
20	France	36330	57.8	3	57	India	6893	26.4	1
21	Norway	39348	54.2	3	58	Iran	18027	23.0	2
22	Slovenia	31023	53.8	3	59	Georgia	9277	25.7	2
23	Japan	39063	53.3	3	60	Brazil	24417	23.9	2
24	Qatar	2749	53.3	3	61	Spain	31939	23.2	2
25	U.A.P	87446	52.0	3	62	Argentina	18278	24.0	2
26	Portugal	20184	48.7	2	63	Vietnam	5093	24.0	1
27	Poland	30856	47.8	3	64	Polignac	6675	23.0	1
28	Cyprus	31920	46.7	3	65	Indonesia	10774	22.6	2
29	Spain	32299	43.8	3	66	Iran	8180	22.2	2
30	Turkey	27749	44.2	2	67	Belgium	33928	33.9	2
31	Porto Rico	31009	43.7	3	68	Hong	12713	33.5	2
32	Canada	39327	43.7	2	69	Uruguay	14283	33.8	2
33	Costa R.	20380	43.3	3	70	Guatemala	7852	33.3	2
34	South Africa	40734	43.1	2	71	El Salvador	7164	30.7	2
35	China	54828	41.0	2	72	Costa Rica	11018	31.6	2
36	Italy	34728	41.0	3	73	Barbados	16119	32.6	1
37	Leban	23342	40.9	2					

Figure 4. GDP and GEI Countries' Rank Position - 2015-2017 Average

Source: Szerb and Trumbull (2016) and country rank datasheet, GEI 2015-2017 raw data. Notes: GDP: 2015-2017 per capita. Dev = country stages of development: 1: resource-driven economy, 2: efficiency-driven economy, 3: innovation-driven economy. South and Latin America/Caribbean countries are shaded.

Chile is the number 1 in South / Central America and the Caribbean, followed by Puerto Rico as the second-highest score in the area. It indicated that although Chile is not yet an innovation-driven economy, the primary source for its competitive advantage is efficiency in productivity and competitiveness. Efficiency-driven economies like Chile have better opportunity perception, cultural support, opportunity start-ups, risk acceptance, and product innovation (Szerb and Trumbull, 2016). Table 3 shows the discrepancy between the highest and the lowest GEI score index. Chile's GEI score is 58.25, where the USA holds the highest GEI score with 84.4 and Burkina Faso holds the lowest grade with 12.6. The discrepancy between the two is 71.8, with a median score of 35.9.

For more detail about Chile's development level, Figure 5 below depicts Chile's

comprehensive GEI index of 73 surveyed countries. GEI score corresponds with the development level represented by GDP PPP per-capita is pretty high with the best-fitting ($R^2 = 0.8$). Chile is located above the development level, which indicates that Chile's overall entrepreneurial performance is somewhat higher, nearly mostly average developed countries.

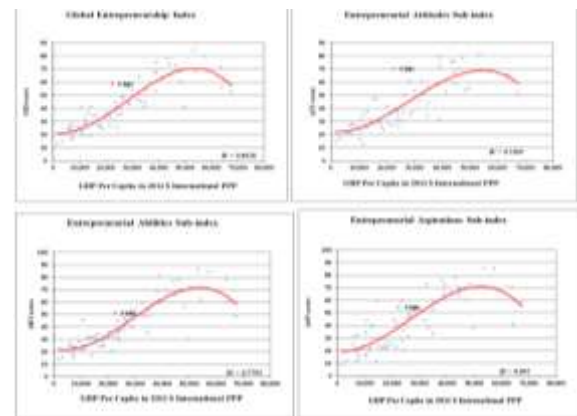


Figure 5. The relationship between the GEI, ATT, ABT, and ASP Scoring against the GDP per capita

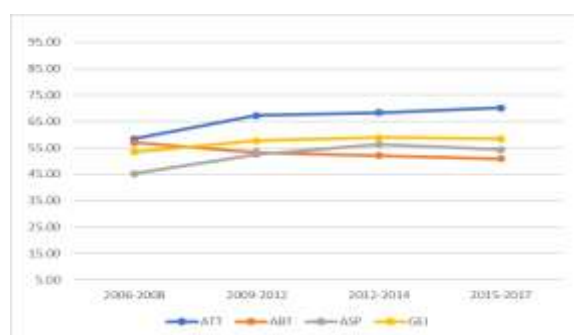
Source: Datasheet GEI 2006_2017_research_three_years

The above figure indicated that Chile's Triple-As (ATT, ABT, ASP) indexes are high above the line. All sub-indexes are highly correlated with the GDP PPP per capita or development level, with correlation coefficients of 0.72, 0.77, 0.69, respectively. Chile's Triple As in the area high above the curve is called the "valley of backwardness," which means that Chile's success to get out of the valley depends on improvements in the country's institutions. The implication is: Chile's GEI Index score and ABT scores can demonstrate the GDP divergence by 77%, while the other factors describe the rest. It can sum up that the connection between GDP per capita towards the GEI, ATT sub-index, ABT sub-index, and ASP sub-index have ratified on

the best-fitting approach utilizing 73 surveyed countries that marked with the higher R2. It means the developed model was rationale and coherence and can support the best results comprehension

Chile GEI and the Triple A Sub-indexes Development Trends

To compare different indicators for Chile’s economic development, the comparison would be divided into 4 different three-year periods allocations that can be examined from below figures. Both figures show the dynamic of development trends of four different time periods.



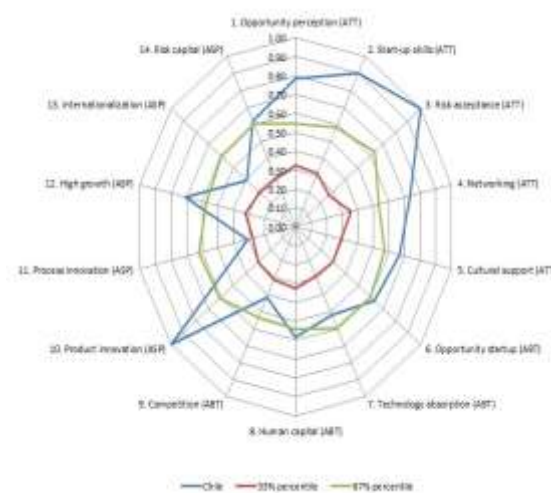
	ATT	ABT	ASP	GEI
2006-2008	58.38	57.05	45.24	53.56
2009-2012	67.31	53.30	52.58	57.73
2012-2014	68.41	52.10	56.29	58.93
2015-2017	70.15	50.89	54.36	58.47

Figure 6a and 6b. Chile’s GEI Yearly Development Trend and Triple A Sub-Indexes
Source: GEI Dataset 2006-2017

From Figure 6a, it can be seen the GEI time trend and its sub-indexes score. The entrepreneurial attitude contributed to the overall improvement of Chile’s GEI Score. ATT sub-index has shown the increasing trend, the significant one mainly from the period 2006-2008 to 2009-2012, and slightly increase in 2012-2014 although the world just still affected by the great financial

crisis. The entrepreneurship abilities (ABT) sub-index has the lowest score, showed a decreasing trend, and pulled down the GEI score (Figure 6b). However, according to OECD and UNESCO reports (2019), Chile showed an increased rate of enrolling in tertiary education. During these periods, the entrepreneurial activities might not involve the high-technology and the newness in their products or service or lack of motivation in entrepreneurship activities.

Analysis of 2015-2017 Pillars and Triple “A” Sub-index



To better understand development trends on the GEI sub-indexes, Figure 7 shows more details of the Triple-A sub-indexes result by applying the lowest and the highest percentile positions to get the normalized scores from each entrepreneurial pillar in all the Triple-A indexes. Theoretically, when the index scores are below the lowest of 33% percentile, these scores imply that they are below the allowed benchmark scores (marked with red color). It means the pillars within these scores need attention, be concerned, maintained, and improved immediately to obtain the highest score. The purpose of normalized score procedures is to afford appropriate benchmarks to

evaluate the best-performing country of measuring the entrepreneurship pillars (Szerb et al., 2016: 16). The average scores within the lowest score 33% percentile and the highest score 67% percentile (marked with yellow) imply that those scores can be maintained or improved to obtain the targeted criterion. On the other hand, all the pillars that have scored over the 67% percentiles mean those scores are over the targeted standard (marked with green color).

Figure 7. Pillar value of Chile in 2015-2017 percentile countries

Figure 8. Pillar Values, Institutional Within 33% percentile and 67% percentile and Individual Variables

Source: Datasheet 2006_2017_research

The profile shows that Chile's performance in all 14 pillars is 71.42% higher than the '67% percentile' with no under-performance below the 33% percentile. It can be summarized that Chile's entrepreneurship profile has a good performance.

The entrepreneurial attitude (ATT) sub-index was the highest sub-index with 70.1. Most of the variables in this sub-index are over the 67% percentile. Figure 6 shows

	PILLARS	INSTITUTIONAL VARIABLES	INDIVIDUAL VARIABLES	Ratio last factor
Entrepreneurial Attitudes	Opportunity Perception	0.78 Finance	0.71 Opportunity Recognition	0.93
	Start-up skills	0.98 Education	0.76 Skill Perception	0.94
	Risk Acceptance	1.00 Country Risk	0.90 Risk Perception	1.34
	Networking	0.70 Connectivity	0.76 Ease Entrepreneur	0.07
	Cultural Support	0.67 Corruption	0.76 Career Status	1.16
Entrepreneurial Attitudes		70.1		
Entrepreneurial Abilities	Opportunity Startup	0.65 Governance	0.77 Opportunity Motivation	0.03
	Technology Absorption	0.52 Tech Absorption	0.62 Technology Level	0.08
	Human Capital	0.46 Labor Market	0.48 Educational Level	0.04
	Competition	0.42 Competitiveness and Regulation	0.48 Competitors	0.43
	Entrepreneurial Abilities		56.8	
Entrepreneurial Aspirations	Product Innovation	0.38 Technology Transfer	0.03 New Product	1.08
	Process Innovation	0.31 Science	0.04 New Technology	0.74
	High Growth	0.71 Finance and strategy	0.58 Growth	0.06
	Internationalization	0.38 Economic complexity	0.48 Export	0.01
	Risk Capital	0.62 Depth of Capital Market	0.71 Informal Investment	0.71
Entrepreneurial Aspirations		54.4		
GEI		58.5 Institutional	0.67 Individual	0.7

that Chile does not have the lowest score below the 33% percentile, even most of the pillars exceeded the benchmark scores, which means that Chile has good performance in the entrepreneurship pillars.

However, Chile has the four lowest pillars with average index scores between the 33% percentile and 67% percentile.

The entrepreneurial abilities (ABT) sub-index has the lowest score amongst the three sub-indexes. This sub-index has two pillars between 33% - 67% percentile; technology absorption, which scored 0.52, and competition, with 0.42. Although these two pillars were light-blue (Fig. 8), these are in the lowest four pillars (Fig. 7). Compare the technology absorption between institutional and individual variables, the entrepreneurs' capability to absorb the new technology (0.68) is slightly higher than the institutional variables (0.62). It implied that Chile needs to enhance and provide the ICT to boost the institutional growth potential.

In the competition pillar, the Institutional variable (competitiveness and regulation, 0.42) is in the red mark, while the Individual variable scores very high with 0.98. Chile entrepreneurs are confident to compete with the competitors with their uniqueness of the product, processes, or services. However, the government regulations limited their entrepreneurial activities and became the block-barriers. Chile's policymakers need to deregulate the rules by providing incentives for the entrepreneurs or banning the monopoly, allowing the entrepreneurs to compete in the market.

The entrepreneurial aspirations (ASP) sub-index has an overall score of 54.4. This sub-index has two lowest pillars; process innovation with 0.31 and internationalization with 0.39. These two pillars are also between the 33% - 67% percentile (Figure 7) and in yellow mark (Figure 8). Both posts have low support from the Institutional variables.

In process innovation, the Institutional variable (science) has a score of

0.45, while the Individual variable (New technology) poses a high score of 074. From the entrepreneurs' side, it means they have occupied a sufficient level of innovation in their entrepreneurial activities but lack support from Chile's policymakers. To improve, Chile needs to provide more research and development institutions and develop more scientific research for highly qualified scientists to support entrepreneurs' activities.

For the Internationalization pillars, the Individual variable is higher (0.63) than the Institutional variable (0.49). It means the Institutional side should improve their performance by deregulating the export-import activities that can force the entrepreneur to expand the market to other countries by exporting the goods, not only in the domestic market. The institutions also need to be more open to international entrepreneurs. Another effort that the Institution can make is facilitating the entrepreneurs to build complex networks. In terms of Institutional vs. Individual variables, the GEI Index of Chile depends on Individual variables' forces which has a score of 0.76, compared to the Institutional variables that a score of 0.67. These figures show that in the case of Chile, the individuals contribute more efforts to the overall GEI Index with less awareness from the Institutional side. However, Chile's policymakers' efforts to improve the overall GEI Index will result in better outcomes and better improvement for the Institutional side.

Comparison between Chile and Other Countries

Chile is the number 1 economy in Latin America/Caribbean, shown in Figure 4. For the analysis, the GEI Datasheet provides the possibility to find the

weaknesses of Chile compared to other countries in the region. The pillar spider in Fig. 10 shows that Chile can improve its pillars compared with Colombia and Puerto Rico. In terms of the GEI Index, Chile is in rank 17 with 58.5, followed by Puerto Rico in rank 31 (43.7) and Colombia in rank 41 with 36.4. However, Colombia is in rank 3 in Latin America/Caribbean region. The difference between the score is quite a high gap between Chile and Colombia (60.63), while the contrast with Puerto Rico is about 33.79%.

	ATT	ABT	ASP	GEI
Chile	70.15	50.89	54.36	58.47
% Diff.	85.94%	61.55%	36.24%	60.63%
Colombia	37.7	31.5	39.9	36.4
% Diff.	59.43%	4.88%	61.78%	33.79%
Puerto Rico	44.0	53.5	33.6	43.7

Figure 9. GEI and Sub-Indices Comparison of Colombia-Chile, Colombia and Puerto Rico
Source: World GEI Datasheet 2006-2017

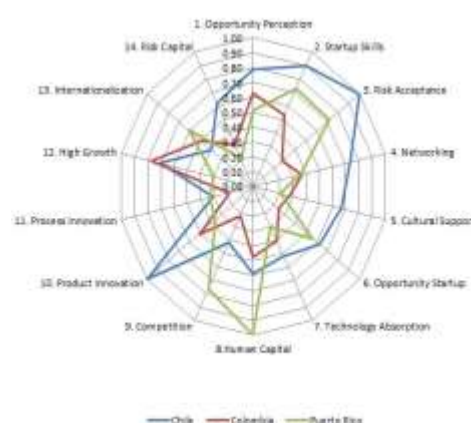


Figure 10.. The 14 Pillars Comparison of Colombia-Chile, Colombia and Puerto Rico
Source: World GEI Datasheet 2006-2017

Figure 9 provides the breakdown of the GEI Triple A. Chile obviously is not comparable in the overall GEI score, leads in two sub-indexes, but still, Puerto Rico leads in the ABT sub-index with 53.5 compared to Chile (50.89) and Colombia (31.5). The previous section has already offered a detailed analysis of 14 pillars for the country of Chile.

Figure 10 provides the breakdown of the details comparing 14 pillars between Chile, Colombia, and Puerto Rico. The figure shows the differences between the three countries. Colombia has outperformed both Chile and Puerto Rico in the pillar of High growth (ASP sub-index) with a score of 0.770 (Chile with a score of 0.70, and Puerto Rico with a score of 0.30). Colombia also outperformed Chile in terms of the pillar of Internationalization (ASP sub-index) with 0.49, while Chile is 0.39. The weakest pillars or bottleneck for Colombia are in the pillars of Opportunity start-up (0.24), followed by the Competition pillar with a score of 0.22 (both these pillars are in the ABT sub-index). The last weakest pillar is in the ASP sub-index, the pillar of Process Innovation, with a score of 0.182.

On the other hand, Puerto Rico outperformed Chile in four pillars. Two pillars are in the ABT sub-index; the pillars of Human Capital (a score of 1.00 vs. 0.58) and Competition (0.76 vs. 0.41). Another two pillars are ASP Sub-index; the pillars of Process Innovation (a score of 0.33 vs. 0.30) and Internationalization (a score of 0.61 vs. 0.39).

Chile outperformed in Colombia and Puerto Rico in nine pillars; Opportunity Perception, Start-up Skills, Risk Acceptance, Networking, Cultural Support (ATT sub-index), Opportunity Start-up, Technology Absorption (ABT sub-index), Product Innovation, and Risk Capital (ASP sub-

index). The high performance of entrepreneurial activities in Chile because of for the last decade, Chile has done several reformations to reduce the barriers, including the regulation to nascent entrepreneurs' development, providing financing at a national level, and implementing new initiatives to improve the opportunity perception (Torres Marín, Leporati, and Roses, 2020).

Simulation of 10% increase in GEI and Policy Recommendation based on Penalty for Bottleneck Methodology

The GEI Index applies the methodology that is so unique called 'penalty for bottleneck' (PFB) methodology. This PFB methodology is helpful to construct some recommendations for the policymakers to improve the entrepreneurial activities (Suse and Sanders, 2018). This concept is applicable because of three main elements. Firstly, the good pillars partially compensate for the weakest/worst pillars. Second, improving the bottleneck pillars contributes to the GEI score improvement. The improvement extends to comparing the bottleneck pillars with other pillars. The last, by improving the weakest pillars that underperform, the policymakers can do some reformation that induces the entrepreneurial activities (Szerb et al. 2016). The above analysis for Chile presents a coherent description of the country's entrepreneurship ecosystem. The analysis has provided Chile's weakest and strongest pillars that are advantageous for the process of policy recommendation and decision-making. For better insight, Figure 11 provides a picture of Chile's weakest and strongest pillars from each sub-index.

Pillar	Required Increase in Pillar	Percentage of total new effort
Opportunity Perception	0.00	0%
Start-up Skills	0.00	0%
Risk Acceptance	0.00	0%
Networking	0.00	0%
Cultural Support	0.00	0%
Opportunity Startup	0.00	0%
Technology Absorption	0.00	0%
Human Capital	0.00	0%
Competition	0.06	19%
Product Innovation	0.00	0%
Process Innovation	0.17	53%
High Growth	0.00	0%
Internationalisation	0.09	28%
Risk Capital	0.00	0%
Total effort	0.32	100%

Figure 11. Chile's Worst Pillars and Chile's Strongest Pillars
Source: GEI Datasheet

The illustration from Figure 11 shows the weakest pillars are the Competition pillar in the ABT sub-index, followed by Process Innovation and Internationalization in ASP Sub-index. The strongest pillars are Risk Acceptance and Start-up Skills (in ATT sub-index), Opportunity Start-up in ABT sub-index, and Product Innovation in ASP sub-index. To increase a 10% improvement in the overall GEI score, a practical simulation is going to apply by implementing optimal policy allocation and using the principle of efficient resources. The simulation of the attempt is seen in Figure 12.

CHILE'S PILLARS - THE WEAKEST TO THE STRONGEST PILLARS		
Entrepreneurial Attitudes	Cultural Support	0.67
	Networking	0.73
	Opportunity Perception	0.78
	Start-up skills	0.90
	Risk Acceptance	1.00
	Entrepreneurial Attitudes	70.1
Entrepreneurial Abilities	Competition	0.06
	Technology Absorption	0.52
	Human Capital	0.58
	Opportunity Startup	0.63
	Entrepreneurial Abilities	80.90
Entrepreneurial Aspirations	Process Innovation	0.33
	Internationalisation	0.39
	Risk Capital	0.62
	High Growth	0.71
	Product Innovation	1.00
Entrepreneurial Aspirations	54.05	

Figure 12. Simulation of optimal policy allocation to increase the GEI score by 10% in Chile
Source: Author's works

Figure 12 highlights the three worst pillars that underperform or the bottleneck of Chile discussed previously. In the Entrepreneur Abilities sub-index -

Competition, and two in the Entrepreneurial Aspiration sub-index; Process Innovation and Internationalization. To escalate the GEI score by 10%, Chile needs to put into Competition with 19% of total new efforts that will increase by 0.06 basis points, followed by Internationalisation that needs 28% of total new efforts to increase the score by 0.09 basis points. The most significant percentage for total new effort will go to Process Innovation, which needs 53% to increase by 0.17 basis points. A total of 100% of new efforts would result in the improvement of 0.32 basis points.

The recommendation for the improvement has been discussed earlier. In the Competition means that Chile should reform its regulation that can support the entrepreneurs, such as anti-monopoly effectiveness, and limit the big business to be dominant in the market. As mentioned before, the process innovation means to support entrepreneurship; Chile should provide more Research and Development, and spend more expenditure on research centres and research institutions.

In process innovation, to improve, Chile needs to provide more research and development institutions and develop more scientific research for highly qualified scientists to support entrepreneurs' activities. The Internationalization pillar can be improved through deregulating the export-import activities that can force the entrepreneur to expand the market to other countries by exporting the goods, not only in the domestic market. The country needs to be more open to international entrepreneurs. Another effort that Chile can make is facilitating the entrepreneurs to build complex networks

	Old Score	New Score	Change	% of Total New Effort
ATT	70.3	76.0	5.6	0%
ABT	81.0	84.7	3.7	19%
ASP	54.4	62.5	8.1	81%
GEI	58.56	64.387	5.83	100%

Figure 13. Simulation of optimal policy allocation to increase the GEI score by 10% for Chile in three sub-indexes

Source: Author's work

Figure 13 above describes the old and new scores for all three sub-indexes that increase with the additional total new effort input. The Entrepreneurial Abilities sub-index would increase into a new score of 76.0 from the previous score of 70.3 (change +5.6) with the support of 19% of the total new effort.

The Entrepreneurial Aspirations sub-index would increase from 54.4 to a new score of 62.5 (+8.1) with the help of 81% of the total new effort. This % of the total new effort is relatively high for Chile to achieve and might need more time for Chile, but with the seriousness of Chile to improve, it seems achievable. So, with the intervention of total new effort, Chile's GEI Index score would increase to 64.387. This new GEI score would place Chile together with Israel in position number 14, only one position below Germany in rank 13 with a score of 65.6, and surpass the position of Belgium (62.6) and Taiwan with 60.8. As Chile is already in rank 17, Chile can achieve this position.

CONCLUSION

Entrepreneurship is pivotal for a country's development and economic growth by opening new employment, bringing and introducing innovations, and efficient and effective production systems. Entrepreneurship can be productive, unproductive, and destructive. As Entrepreneurship is crucial, many scholars spent the effort to measure

entrepreneurship. One of those measurements is the GEI Methodology. The GEI Methodology provides an extensive analysis of the countries' entrepreneurial ecosystems, including institutional and Individual variables. GEI methodology consists of three sub-index well-known as Triple-A, 28 variables, and 49 indicators. The uniqueness of the GEI methodology is the application of the penalty for bottleneck (PFB). This PFB methodology works based on the weakest and the strongest pillars of a country, which will be the basis for the recommendation for the policymakers, depending on the country's situation.

This qualitative research discussed the performance of Chile's Entrepreneurship profile during the period 2015-2017. The data was obtained from the available GEI Research during 2006-2017. The country is in position 17 with a score of 58.5. Compared to the neighbourhood countries in the region of Lati America/Caribbean, Chile is better compared with Colombia and Puerto Rico, as these countries have the pillars that outperformed Chile. The simulation with a 10% improvement scheme recommends that Chile improve its three underperformed pillars; Competition, Process Innovation, and Internationalization.

The improvement would bring Chile to the new position into rank 14 together with Israel and surpass Belgium and Taiwan. It is essential to understand that the 14 pillars of the GEI might not reflect the overall structure of EE, which is very complex. By optimizing the GEI, the Index score does not mean that the entrepreneurial ecosystem in a country will also optimize due to the country's situation in terms of the political situation, institutional, and the business environment. The presence of Penalty for bottleneck (PFB) methodology does not

mean the country's weaknesses do exist. It needs a further investigation to examine the true nature of bottlenecks in a country. The recommendations are possibly different due to the real situations faced in Chile.

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