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Manufacturing Effectiveness in Latin American Countries for South Korea: Holistic Approach in Energy Uses and Infrastructure

Efectividad del sector industrial de América Latina y Corea del Sur: Enfoque holístico sobre los usos de energía e infraestructura

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Abstract
Latin America has been noted as a promising partner for South Korea, but the geographical barrier has locked in potential business opportunities. In this context, practical investigations are required for the manufacturing sector's environmental conditions and system. It was introduced some functional indexes of energy consumption and infrastructure to apply them to the manufacturing sector under PEST analysis. This analysis found the environmental differences in some critical aspects: alternative energy policy in political factors and the gap of energy intensity, which would more stand out with the propensity of electricity consumption in the economic consideration. However, there is a positive transition: the increased capacity of installed power generation would decrease the risk of relatively weak accessibility to the electricity supply.
Key words: South Korea, Latin American, industry sector, PEST analysis, energy.

Resumen
Latinoamérica se ha destacado como un importante socio comercial para Corea del Sur, pero la barrera geográfica ha imposibilitado las oportunidades potenciales de cooperación. Este artículo se propone realizar investigaciones sobre las condiciones ambientales y características del sector industrial. Se construyeron algunos índices funcionales de consumo de energía e infraestructura para aplicarlos al sector industrial bajo el Análisis PEST. Este análisis permitió identificar diferencias ambientales: en lo político, se identificó la creación de una política energética alternativa y, en lo económico, se identificó la brecha de intensidad energética, que fue más evidente con la propensión del consumo de electricidad. Sin embargo, se encontró una transición positiva: la capacidad incrementada de generación de potencia instalada mejorará la accesibilidad al suministro eléctrico.
Palabras claves: Corea del Sur, LatinoamericanoAmérica Latina , sector industrial, Análisis PEST, energía.

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1. Introduction

As the position of South Korea, the industrial sector has led its national development and helped peoples to be involved in society regardless of their background. Although Latin America has been considered as a great partner for international business for South Korea, the regulations and uncertainties in this region always set barriers for investment. However, as business conditions have been improved, more progressive ideas and opportunities are necessary for remarkable advances in most sectors. For this concept, this paper dedicates to analyze the industrial environment and energy supplying conditions for business comparing to South Korea.

The result, which this paper mainly deals with, and the environmental circumstances and characteristics of the manufacturing industry in Latin American countries explain how the Korean companies have an interest and investing in this region. This way of approach would help to understand that some of the natural awareness or on-trend regulations could be accepted as absurd or unusual for the country, which is much more familiar with East Asian customs. From the economic sense, in other words, the aspect which has a comparative advantage in Latin America could be able to be offset or, on the contrary, it could cause a relative disadvantage being canceled out. Such an understanding of context would give a chance to a more detail sales strategy for FDI from South Korea as well as maximize the effectiveness of investment, in terms of South Korea, in Latin American countries.

At the first chapter, this paper will briefly introduce PEST analysis, such is one of the most common methods to analyze the Macro-environmental factors would help to understand the mutual relationship between Latin America and South Korea, by focusing on not figuring out a microscopic approach but a macroscopic aspect of the capacity and infrastructure in energy sector. In the following second chapter, this paper will present some indexes of energy which are directly related to the manufacturing industry in this region. This paper

focuses on the regional perspective rather than the national perspective. It means that the geographical definition of the border widely gives conceptual attention. It is because of what the physical environment has a significant difference between both Latin America and South Korea; thus, the geographical infrastructure and technological share in energy would be emphasized in this paper. For instance, South Korea has three directions to advance in the sea, and only the north is completely blocked at the present time. This geographical structure is unique around the world, but it has a great advantage to utilize its seaports. However, most South American countries have only one side of the sea, and even Paraguay and Bolivia depend on harbors in foreign countries. Furthermore, when it comes to mountain conditions, energy issues, and inland transport, soft and hard infrastructure for fuel uses are important comparing to the stable dependency on vessel transport in South Korea. In this context, the works for an understanding of background is necessary from the beginning.

Then, the fourth chapter describes the infrastructure and unique movements for energy in Latin America using the previous index and PEST analysis model. As mentioned early, this paper aims to categorize and bring the characteristics of Latin America to surface. The pure index and PEST analysis origin from international agencies or individual institutions of each country. Deduction from these works would be useful to understand. However, this analysis focuses more on "the comparison and points that are relevant to South Korea", insofar as this work dedicated to, more various set of comprehension and opportunities for connecting two regions would be possible after applying some progressive models and theoretical concepts.

2. PEST Analysis model

There are many kinds of environmental analysis methods that probably could be applied to the manufacturing industry in Latin America. Regards to this approach, Richard Fletcher elaborated "the holistic approach to internationalization", which shows the connection

between industries and foreign organizations as visible figures (Fletcher, 2001). Karen Mingst also introduced three stages for individual, state, and international systems by each role and structural factors in a systematic method (Mingst & Arrguín-Toft, 2018). For the aspect of industrial development, Labaka (2016) tried to classify the resilience type from internal and external factors as technical, organizational, economic, and social (Labaka, Hernantes, & Sarriegi, 2016). Nonetheless, this paper utilizes one of the most common methods for Macro-environmental analysis, PEST analysis, in the marketing field. This term is an acronym of Political, Economic, Social, Technological factors that help researchers to find out how each factor function for the market environment and what kind of aspects must be dealt with beforehand. Frequently, this method has been presented with SWOT analysis or at the more supportive tool with Demographics, Ecological, Ethical, and Intercultural aspects. Consequently, this paper explains under the PEST model, because (1) unless focusing on South Korea and Latin America, it would secure objective analysis by following general and compatible method, (2) it bases on factor analysis, but allows it to minimize marginal and subordinated factor, and (3) it provides further research such as FMMA (Fuzzy model of the macro-environmental assessment).

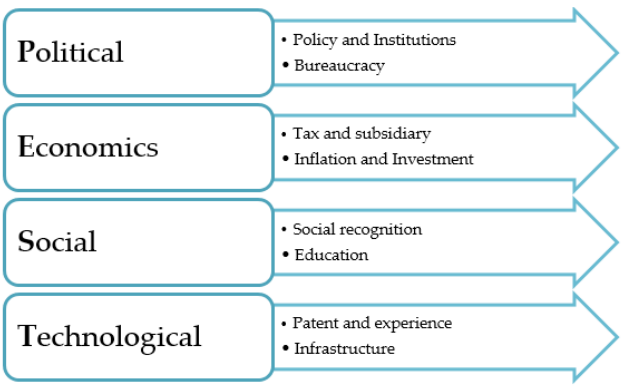

Figure 1. Basic PEST Model

Source: self made

As Figure 1 describes, the basic PEST model includes fundamental factors that construct the market environment in multiple directions. This analysis describes the multi-dimensional results and demonstrates the general terms of the Latin American industry, not just limiting the manufacturing effectiveness, energy nor transport sector. However, as the goal of this paper and book explain under the relationship between South Korea and Latin America, if one tries to make a simple generalization, it could easily cause generalization fallacy. In this context, even though some researchers utilize the 5-point Likert-type Questionnaire adding importance weight (Igliński, Iglińska, Cichosz, Kujawski, & Buczkowski, 2016; Ulubeyli & Kazanci, 2018), it could be inclined to biased results for immoderately specific industry and replies. Therefore, this paper would more concentrate on the original type of PEST model to abstain from fallacies.

3. The numerical characteristics for energy in Latin America from the perspective of the manufacturing industry

Under the condition of energies, finding differences between the Latin American region and South Korea is more evident than that of commons. In short, there are three key issues to be considered before it is handled: (1) the propensity of energy consumption and dependency, (2) the different energy sources, and (3) uncompleted accessibility to energy (electricity). First of all, the total energy consumption in the region remarked 635.9 MTOE in 2017. Among them, the industrial field accounted for 197.9 MTOE, which is about twice more than that of residential (99.9 MTOE) and six times equal to that of the commercial and service sector (33.2 MTOE). Even though the most significant piece of this pie is the transport sector (237.4 MTOE), the industrial sector occupies a substantial portion. One of the crucial points in this region is that the quantity of energy export (444.7 MTOE) is higher than energy import (291.3 MTOE). Furthermore, the total energy production in this region over 1,068.4 MTOE (OLADE, 2019). There are indeed gaps among importing

countries and exporting countries. For instance, except for South America -Middle American countries, the Caribbean region, and Mexico- they are energy-exporting countries except for Trinidad and Tobago (Trinidad and Tobago depends on oil and natural gas production within its territory). However, the energy supply in this region is not a grave problem comparing to others. Venezuela, Colombia, and Ecuador are oil-producing countries; Bolivia has a vast reserve of natural gas; Brazil produces biomass energy as much as oil energy; and Paraguay, which does not have oil reserve nor natural gas, depends 60% of their energy on hydropower and export the surplus.

Table 1. Energy consumption for each sector (Refer to SIELAC and KEEI)

Energy Consumption (Unit: MTOE)	**Latin America**	**South Korea**
Total energy consumption	635.9	233.9
Industrial	197.9	144.3
Transport	237.4	42.8
Residential&Comerce&Public	133.2	46.9

Source: self made

Until this point, it seems like there would be no problem for South Korea to proceed with the manufacturing business in this region with enough energy supply. However, the propensity for the energy consumption of both countries is significantly different. South Korea consumes 233.9 MTOE annually, and half of them come from oil (50.39%). As this country does not have an oil reserve, South Korea depends on 94% of energy resources from the foreign market. If it excludes nuclear power plant energy, it will decline to 83.5%. However, the primary material (Uranium) for this generating process only could be supplied by import, thus it is generally classified as foreign dependence. Furthermore, the energy intensity index also must be mentioned for this issue.

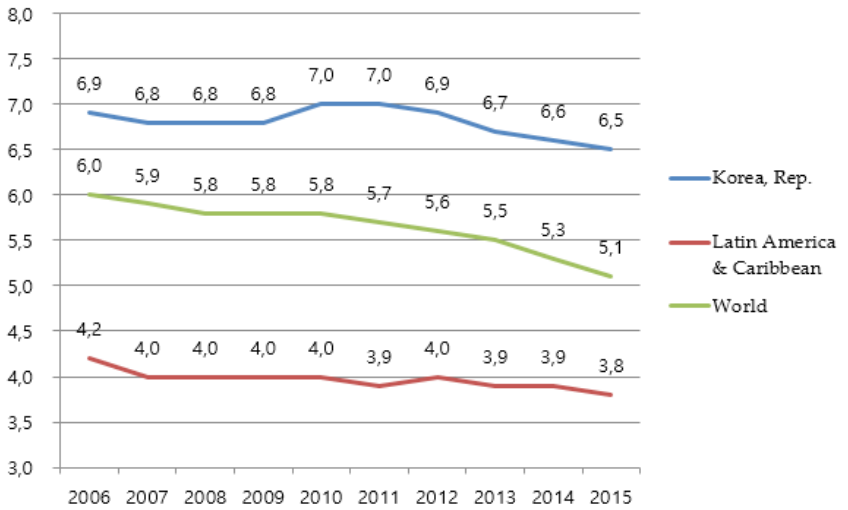

Figure 2. Energy intensity index; Latin America and South Korea (The World Bank)
* Energy intensity level of primary energy (MJ/$2011 PPP GDP) from 2006-2015

Source: self made

The above index is based on energy uses per unit of GDP and usually cites the US PPP 2011. According to Figure 2, elaborated by the World Bank, South Korea needs twice more primary energy against the Latin American region to produce an equal amount of GDP. The reason why this index is critical that it describes how much energy is required for the leading industry of one country. The energy intensity of Latin America is only 70-80% of the world average, but South Korea records even higher than the number of the world average. As regards, the total energy consumption in the industrial sector in Latin America accounts for 197.9 MTOE. However, South Korea uses 61.68% of the total energy consumption in this sector, which is equal to 144 MTOE, and it overs the sum of industrial energy consumption for Mexico (44.5 MTOE), and Brazil (84 MTOE). In this context, if one accepts the energy condition of Latin America and applies it to any industry in South Korea, it would take a high risk and payback for energy uses.

Table 2. Fossil Fuel consumption (Refer to SIELAC and KEEI)

Share of Fossil Fuel (Unit: MTOE)	**Latin America**	**South Korea**
Total Energy consumption	635.9	233.9
Fossil Fuel Total	433.1	175
Oil derivates	306.1	118.0
Natural gas(+LPG)	112.1	24.1
Coal	14.9	33.4

Source: self made

As this paper describes early, half of its energy consumption of South Korea depends on oil resources. Furthermore, fossil fuel-oil, coal, and natural gas account for three-quarters of the total energy consumption. Moreover, even if the share of renewable energy becomes meaningful, it only marks 5.35% of the total. In contrast, the most significant energy resource in Latin America is natural gas. In 2017, the Latin America and Caribbean region utilized 34% of total energy uses from natural gas and only 31% of it from oil. The overall share of fossil fuel is also less than in South Korea (71%). This energy mix seems friendly for the environment at first glance. However, it could be a critical problem for the manufacturing machine upon the perspective of fuel and management system, so that it has to be considered from the first step. For example, the Brazilian government has set mandatory ethanol blend in gasoline since 1993. It is different from the concept of "hybrid vehicle" or "electric vehicle" in South Korea for resources as well as the obligatory level.

There is also a positive aspect of these differences. The energy cost in Latin America has been more stable than South Korea against the variation of international oil prices. These countries are more dependent on natural gas than coal, so that

they are relatively liberal from the massive consumption of China, which consumes about 40% of the total coal consumption of the world. Besides, compared to Korea's high dependence on Nuclear Power plants, most of the electric power in Latin America is generated from hydropower plants. As above, Latin American countries are less influenced by the international energy market than South Korea does.

Lastly, the accessibility of energy (generally signifies the electricity) is an essential factor. For recent days in South Korea, this issue has not been regarded as an agenda. Since 1995, which the research has been settled, the accessibility to electricity in South Korea has kept 100%. In other words, there has been no problem to get provided energy no matter someone being in a city or rural area. However, this issue is the crucial and seventh goal for SDGs (Sustainable Development Goals), and 12% of the total population in the world is incapable of using electricity despite the index has been improved. In the case of Latin America, the accessibility to energy has been maintained upper than 95% since 2010. Especially, Brazil, Chile, and Mexico presented 99% since 2010. It is also notable that 99% of the urban area in Latin America can access electricity from 2010. However, this paper focuses on the industrial circumstance, so that applying the general economic premise, which the land occupies an essential role for production cost in perspective of ground rent, the rural area should be recommended for plant cite. However, 10% of the population in this rural area could not access to electric power. Chile, Venezuela and Argentina achieved 100%, but Brazil, Mexico, Colombia and Paraguay marked a middle of 90%. This issue, the concept of energy share and integration, requires another sort of approach comparing to energy independence or resource diversity. This problem is mainly based on the lack of infrastructure in this region, and it explains the secure of the stable energy supply chain that would be one of the essential requirements to attract international companies and FDI.

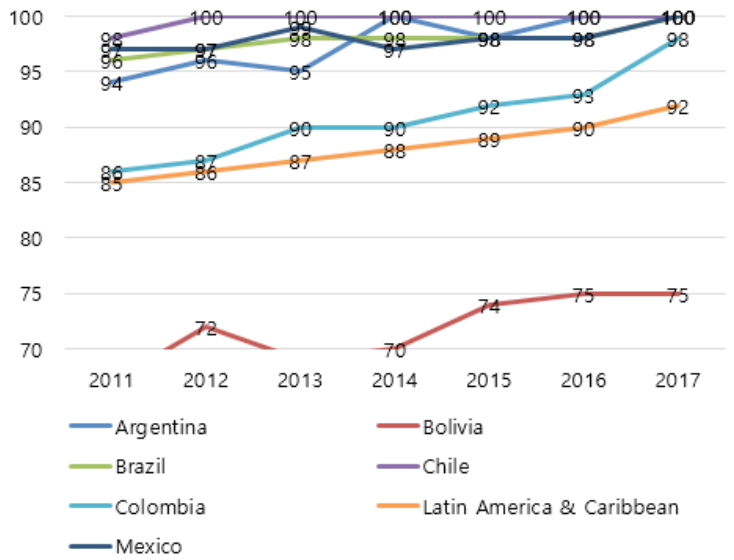

Figure 3. Access to electricity in rural areas (The World Bank)
Source: self made

4. PEST Analysis

AAs this paper focuses on the PEST analysis, it would be better to move out of the old-fashioned image, which let the Latin American market relevant to the United States. It is hard to neglect the regional economic effect completely. However, this paper aims more to analyze the relationship and characteristics for the local perspective of the Latin American market. In this sense, so and it would be helpful to dedicate more to this region. Furthermore, regional conflict does not bring only political controversy. As the geopolitical advantage of Mexico had not been applied liberally for other countries in Latin America, this old-fashioned value was easily neglected when the regional hegemony has emerged. Until this aggressive political event, the Latin American region accounts for about 5% of trade for South Korea, and Mexico has been the

biggest market for South Korea. However, as the first half of 2008, the campaign that Donald Trump has argued, the protectionism in trade goes, and the geological advantage has not been similarly applied for other Latin American countries. Notably, the Caribbean region considers a new vision of regional integration, including deeper trade and economic relations among Central and Latin America based on the incentivization of the institutional machinery and the mechanics of a single market (CEPAL, 2018a). In this context, the conceptual border could expand from the sub-regional to regional, so that the PEST analysis for the regional perspective would be adequate for this regional perspective.

Table 3. Energy consumption for each sector (Refer to SIELAC and KEEI)

Share of trade (Unit: Million USD)	**2014**	**2015**	**2016**	**2017**
Total export of Korea	5,727	5,267	4,955	5,736
Export to L.A.	359	307	254	281
Share against total (%)	6.2%	5.8%	5.1%	4.9%
Total import of Korea	5,255	4,362	4,060	4,777
Import from L.A.	183	160	152	171
Share against total (%)	3.4%	3.6%	3.7%	3.6%
Total trade of Korea	10,982	9,629	9,015	10,513
Trade with L.A.	542	467	407	452
Share against total (%)	4.9%	4.8%	4.5%	4.3%

Source: Ministry of Foreign Affairs of South Korea

4.1. Political factor

Energy management and harness are deeply influenced by the political factor. This is why international organizations concentrate on the two-track method as the private sector and the government sector. For instance, IRENA (International Renewable Energy Agency) took a method that is an opportunity-based approach, which is focusing on the policy maker's response. It also divided the

study into two categories as Policy+Business and Potential+Business. In this manner, the political factor has a vital role in the perspective of policymaking (IRENA, 2016).

According to CEPAL (2018), government spending has a limited impact on the economy. Government revenue has indeed been increased from 2015 to 2018. Furthermore, the main reasons are the reform of tax in South America, so that they could create more room for the industrial subsidiary. However, this region has been affected by the cost of primary material, which is unwilling to be under control of the global market. Therefore, rather than focusing on the general approach, it is better to mention a detailed policy and political program for this.

In this manner, the PROCEL industry program for Brazil and energy alternation plan of Mexico is worth to prepare in the future. PROCEL industry aims to maximize the practices and systems for energy needed sectors, especially in industries as well as SMEs. This strategy is for the conservation of electricity. In real, Brazil has achieved remarkable success by implementing aggressive policy when it confronts an energy crisis. In 2001, due to a long-time drought, the supplement from hydropower fell dramatically. The Brazilian government started to manage energy use in each sector and imposed a fine when each sector over the quota. This policy made a significant success within six months to decrease the demand for electricity to 20% and, more importantly, the three-quarter of energy users changed their right bulb to fluorescent. Furthermore, the production of bioethanol in Brazil had a technological development when they underwent the oil crisis.

Mexico is an oil-producing country in this region and has PEMEX for a public production company. The transition of oil dependence of this country has a significant meaning for the surrounding countries. As this paper mentioned early, all of the Middle American countries and Caribbean region records minus energy trade balance except Trinidad and Tobago. Even though Mexico produces oil and still has 7,037 Mbbl oil reserves, its transition from oil resource to natural gas and other renewable

energies provide a promising opportunity for all. In 2013, Mexico implemented the national energy strategy 2013-2027, which targets the share of non-fossil fuel generation to 35%. In short, it has been five years from the passing year, and the dependence of non-fossil fuel records only 11%. However, the energy efficiency in this country has improved gradually, and this strategy has created the synergy with the Mexican Petroleum Law, which allocates a fund from exploration and extraction of hydrocarbons for innovation and increase of renewable energy. It seems slow and straightforward modification, but the alternation of energy would quickly bring the transition of fuel for the transport sector.

As the diversification of energy in Latin America is one of the main trends for fuel energy, South Korea has tried to achieve this goal to reduce the dependence of diesel fuel and promote alternating energy such as electricity and hydrogen fuel cars. However, there is an evident difference between each other. As the most significant share of energy use in South Korea is the industrial sector, South Korea has approached it for environmental meaning and tried to solve it for the residential sector. For instance, the diversification of fuel does not mean the reduction of energy resource nor the efficiency rather than for prevention for climate change. However, energy diversification and development in Latin America have moved and focused on the energy which never has been used in South Korea. The case of Bioethanol, for instance, there was the 2019 Seoul Fuel Ethanol Conference, but it could not achieve a clear consensus that it would be needed long way to get agreement for the government, industrial sector and oil refiners in South Korea. In this manner, the fuel resource for both industrial and residential parts would be polarized gradually.

4.2. Economic factor

The energy conservation policy is comparable to both regions. Even though Korea has recorded 100% accessibility to electricity, the blackout worries have always been mentioned in social media when the summer comes. South Korea also has an energy plan policy

and economic tools to manage the electricity reserve. However, the vital difference between those comes from the approach for the sector. South Korea has been liberal for electricity uses in the industrial sector. Even if the government has argued the low price for electricity, it has been applied to the cumulative tax impose for the residential sector (CEPAL, 2019). The industrialization of the value chain in Latin America could explain this different tendency. For instance, as FDI 2019 described, representative FDI in Bolivia is focused on lithium hydroxide. This sort of mining industry is relatively less intense in energy use comparing to the manufacturing industry in Korea, so that Latin America could maintain low level of energy crisis impact by market price and tax policy.

As Table 4 shows, the low level of cost for electricity in the industrial sector is remarkable in South Korea. The waste of energy in the industrial sector has been under critics. However, the importance of this sector, actually in the agricultural and manufacturing sector, heavily depends on the electricity supply, so that if they undertook the price increase or cumulative tax policy, they must be under the critical circumstance. However, it would not be similarly applied in Latin America. The National electricity Administration of Paraguay (ANDE) approved electricity tariffs for electro-intensive industries. The discount in VAT for the energy-efficient companies or making a fine for the less energy-efficient company has gradually been settled in the Latin American government (CEPAL, 2014). Furthermore, as the average of the top 5 trading countries in Latin America records more than 10% higher in industrial electricity cost, the improvement for energy-efficient mechanisms in the manufacturing process would be essential for Korean companies.

Even though Uruguay created the National Administration of Electric Power Plants and Transmissions (UTE) to provide commercial benefits and advantages to encourage energy efficiency in the industrial sector, the general economic approach for the energy resource management in industrial sector has aimed to achieve more efficient utilization, expecting to set a requirement plan for both short and long term.

Table 4. Average electricity cost in 2015 (USD/KWH)

Cost for each country and sector (Unit: USD/Kwh)	Industrial	Residential
South Korea	0.096	0.11
Avg. of Top 5 trade countries	0.11	0.13
Mexico	0.08	0.08
Brazil	0.16	0.19
Chile	0.17	0.16
Peru	0.08	0.16
Paraguay	0.04	0.07

* Parenthesis: Comparison with the price of South Korea
* Currency Rate: KRW/USD 1,122.00 (The first monthly exchange rate in 2019)

Source: self made

4.3. Social factor

For the aspect of the social issue, particularly, the negative sign of the poverty variable is consistent with lower purchasing power and fewer financial, human and social capital resources available for entrepreneurs in poor areas (Calá, 2018). It means that, as mentioned early in this paper, the financial balance and business to social connection is evident with social stability. In detail, where the investment and budget come from and how it contributes to society could mutually affect social perception and attitude. According to CEPAL (2018), Latin America received 161.91 billion USD for FDI in 2017, which falls 3.6% from 2016. Consequently, the amount of FDI has decreased by 20% accumulatively from the peak year (2011). For the main reason, there are downward in the price of exporting goods and economic recession. However, under the criteria of sectors, from 2016 to 2017, the manufacturing sector attracted even more amount of FDI than the 2011 to 2012 season compared to the

drastic fall of the Natural resource and service sector. Especially the rise of renewable energy, telecommunications, and the automotive industry is notable as comparative as the world market (CEPAL, 2018b).

Furthermore, this out of trajectory has brought some negative indexes for its labor society. The manufacturing industry, which is generally labor-intensive, has undergone a significant fall of added value evaluation, and the gap with other sectors (Desing, R&D, Sales logistics, Marketing, Consumer service) gets worse comparing to the 1970s (CEPAL, 2018b).

Besides, there are two concerns about this phenomenon. First of all, the manufacturing-focused FDI would reinforce the competitiveness of foreign international companies rather than foster the native industry. For example, even if a lot of foreign automotive companies have established manufacturing factories in Mexico since 2000 and Mexico could increase its volume of trade, it has not helped improve national brand nor create its production mechanism. Secondly, unless the manufacturing industry requires a high level of ethical prosecuting system and education for workers as well as society, the Latin America region still has a weak capacity to apply it (Carruthers, 2008). As the manufacturing procedure and assembly process of ICT industry and automotive sector require specific environmental permits on components, there has indeed been constant convention and development of soft infrastructure with rigid regulations building, the capacity for ethical and environmental education, which are unstable in this region. In conclusion, these kinds of development in social and technical education could easily bring an increase in wage, but that also could cause the next stage of the problem.

As a global trend, the minimum wage of this region has the same tendency. Since early 2018, the objective for the minimum wage has become for stabilizing and enhancing the incomes of the bottom group of society, and it directly has been represented in labor markets. The minimum wages of this region has been increased by about 2.7% to 3.1% (CEPAL, 2018b). However, the

characteristics of this should be considered as stabilization rather than growth. More importantly, even though the median wage has been increased, they now have more competitivity than before; merely speaking, other competitors in this manufacturing region.

In this manner, the goal for the increase of minimum wage in Latin America is far from what the Korean companies undergo on their own. The government of South Korea has marked a 57.42% cumulative increase in the minimum wage from 2010 to 2017. China, where accounts for the largest share of the trading country for South Korea, also has raised the minimum wage twice for the same period (average of 4 big cities). Due to this recent drastic change, the manufacturing plants have moved to South Asian countries. However, Vietnam, one of the representatives, simultaneously raised 5.3% for minimum wage this year. Remarkably, this scale is a relatively low number. This emerging country has raised more than 14% each year from 2013 to 2016. Considering this transition, reinforcing or maintaining the competitiveness in the manufacturing sector, the low level of wage would be essential to attract Korean investors and other foreign companies. On the other hand, governments of Latin America would require a certain level of contribution or engagement from companies to set ethical and technical education and recognition for their community. Therefore, expecting labor unions and civil society to understand this unbalancing condition, sustain low wages with advanced education levels, could be a reckless idea.

4.4. Technological factor

As humanity has been on the way of the environmentally unsustainable method and hurt by the pollution and climate change for the use of natural resources, business and industry have a vital mission for admiring and respecting the value of humanity, including environmental sustainability (Fitzpatrick & Dooley, 2017). In this context, Latin America has been a great follower of this goal for the concept of renewable energy.

For example, Brazil has proceeded with a mandatory ethanol blend for vehicles. This obligation applied since 1993, and it has gradually increased the ratio of ethanol, so it achieved 27% in 2015. This expansion of renewable energy also has been applied in other ways. The Brazilian sugar and ethanol exporters are eligible to receive tax credit since 2011. Using renewable energy in the national territory is currently on the path of operation. One of the leading programs for this project is PROINFA (Programa de incentive, a Fontes Aleternativas de Energia Elétrica) it has affected for the most of renewable energies.

Moreover, it is notable that the installed power generation capacity is increasing as its development. Even though it mainly comes from the outside of the top 5 trading countries with South Korea, so it is not notable for Korean companies, but there has been a significant improvement in this field. Also, according to Kober (2016), the average world share of GDP for energy investment accounted for 1.7%, but Latin America recorded 2.0% (Kober et al., 2016). Regards to this, as the aspect of Gross Fixed Capital Formation, the investment for this is mainly led by middle-upper and high-income countries exceptionally in Latin America, and this region has focused on the ICT infrastructure and clean energy (CEPAL, 2016). Additionally, regional cross border investment has affected positive results such as integration and transition of energy and accessibility of electricity. For instance, the IIRSA (Initiative for the Integration of the Regional Infrastructure of South America) has hosted 44 small and premier projects with more than 49 billion US dollars. It accounts for the highest percentage for investment scale per project (COSIPLAN, 2017). Conclusively, this trend of energy generation increase and investment would be helpful for the energy accessibility in rural areas, which this paper explained in the third chapter, and stable supply for the available energy resource.

Table 5. Improvement of Installed power generation capacity (Refer to SIELAC and KEEI)

Capacity for each country (Unit: Mwh)	2013	2014	2015	2016	2017	Growth (2013-2017)
South Korea	82,296	93,216	94,102	100,180	116,657	41.8%
Latin America Total	239,512	362,914	375,454	400,648	414,644	73.1%
Avg. Top 5 trade countries	45,941	47,898	50,190	54,058	56,183	22.3%
Mexico	64,131	65,452	68,026	73,511	75,686	18.0%
Brazil	126,747	133,926	140,896	150,421	157,580	24.3%
Chile	18,951	20,085	21,017	23,029	24,106	27.2%
Peru	8,825	8,825	8,825	8,811	8,811	-0.2%
Paraguay	11,051	11,203	12,189	14,518	14,735	33.3%

Source: self made

5. Conclusion

Applying the PEST analysis, this paper explained the different characteristics of Latin American countries and South Korea for the perspective of energy infrastructure in the manufacturing sector. The policy for fuel energy and electricity has been presented in different ways. In the first place, as the aspect of political factors, Latin America has shown the intention to develop renewable energy for fuel and electricity, such as bioethanol and hydropower generation. This political approach and resource directions are mostly inexperienced for the Korean manufacturing industry, particularly for the energy-intense companies.

In the second place, the economic approach describes the electricity price for the industrial sector and the residential sector. As the second chapter explained, the intensity of electricity in

the industrial sector of South Korea is notable comparing to the propensity of Latin America, which is less dedicated to this sector. How they could stand against the industrial electricity cost and react to the policy would be a vital factor for manufacturing companies.

In the third place, regards as the perspective of social factors, there is a dilemma for balancing the wage growth and education level. Even though it has gone well until these days with the rising wage of China and South Asian countries, it would become a risky point within economic growth. The weak capacity to apply the ethical and environmental education has made a gap from strict regulation and prosecuting system in this region. In this context, governments of the Latin American countries could require some kinds of engagement for foreign companies to social education and welfare.

For the last place, but meaningful to mention, it is the technological aspect. As the countries in this region have dedicated to clean energy and social balance, the installed capacity of power generation and productivity of energy have been improved gradually. It is positive enough for Korean manufacturing companies as well as a researcher for the sense of energy reserve and utilization. As Latin America has tried to develop their diversity of energy resource, the heterogeneity from new fuel would be minimized for the new incoming Korean companies, which are mostly designed with a fossil fuel engine, and the adaption to these resources could provide another opportunity to access to other countries in this region.

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