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The Influence Of Industrial Sector On The Economic Growth Of Albania

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Abstract

Since 1998, Albania has experienced a significant economic growth. The Gross Domestic Product grew annually until 2013 without stops and recessions. It is a "praxis" to imagine that a developed country, by an economic point of view, can sustain high living standards for its inhabitants. These countries are recognized by a first economic analysis through what they produce. The base is a mechanized agriculture and the biggest part of workforce is employed in service sector. The most important feature of a developed country is still a modern industrial sector. Industrial sector symbolize the engine of economic growth and is a guarantee of economic stability in the medium and long term. The intention is to analyze whether the Albanian economic growth of the last sixteen years, was constant, continuous and healthy. We would see the performance of the industrial activity in the country through regression analysis and we will connect the course of Manufacturing, Mining and Construction to GDP product. The goal is to find out if in Albania took place an "Industrial Revolution" who led the country economic growth or if economic growth was a consequence of other components and is characterized by an inherent weakness and instability. We will notice which of the sub-sectors of the industry and was the most active and who has had the most difficult problems. It will highlight the increase in the weight of the industrial sector on the Albanian national economy and the limits that did not allow a full industrial development. Finally, we will suggest a series of measures and strategies that tend to enhance the degree of organization and integration among the various sectors of industrial activity.

Key words: Mining, Manufacturing, Construction, Gross Domestic Product, Economic Development.

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INTRODUCTION

Industrial sector play a vital role in the economic development of any country. Since industrial revolution industrialization regarded essential for rapid development of the country. In economics, the term "Economic Development" is referred to the complex process of structural transformation, changing the production structure that marks the transition from a mainly agricultural economy to an economy in which increases the weight of the modern industrial sector. Theories of Economic Development were present in classical economic discipline since Adam Smith, but referred generally to the ways in which the countries that passed the stage of industrial take-off (to use the famous expression economist Walt Whitman Rostow) could maintain and manage a balanced and constant. In 1949-50 only 7.7% was industrial contribution towards the GDP. Therefore due to lack of industrial growth performance a massive task of industrialization was announced in 1948. The fifteen years to follows extending from 1949 to 1964-65 recorded as a remarkable growth rate to an average of 15% annually in the output of the modern manufacturing sector. The compound growth of output was as high as 25 percent per annum during 1950-1954 during the next five years (1954-1959) it, however declined to 12.7%.

In analyzing the link between the industrialization of a country and its economic development, we cannot avoid the theories on economic and industrial growth. In this case not worth neglected the theory of late industrialization Aleksander Gerschenkron. This theory is based on the assumption that the less developed countries can shorten the time of its development through the adoption of leadingedge technologies created beforehand. This position, which is defined as the advantage of backwardness, consists of four laws:

1. The more a country is backward, the more intense is its industrial development. Development processes in industrial countries late are much shorter and faster than those that occurred in countries with early industrialization; these, in contrast, they took a much longer time to complete technology development and capital accumulation, but also to have the transfer of technology and imports of capital.

2. Supremacy of heavy industry. Late industrialization is able to develop the chemical industry and heavy industry (steel, metallurgical, engineering etc.) more quickly than those of the most advanced countries; This is because the backward countries, although lacking of skilled labor, are able to establish new technologies through imports, are able to introduce new institutions for investment in large-scale, while the more advanced countries have a hard time to get rid of outdated equipment.

3. Tendency to centralize production. The trade groups areexperiencingatendencytocongregateinlarge trusts(under monopoly),as capital investmentsonalargescalerequiresmall costs of operation

4. Irrelevance of the logical relationship between capitalist development of agriculture and industrial development. In the industrial countries late there is not necessarily a logical correlation between the development in the capitalist sense of agriculture and industrial development; in other words, industrialization can reach maximum heights of development, but agricultural capitalism may still remain in a state of backwardness. This is because the motor for development is not agriculture (as it was in countries with early industrialization), but banks orGovernments.

Beyond theories exposed and other theories thatfor obvious reasons we could list, we will try to see if Albania has benefited by late Industrialization in recent years, according to the Gerschenkron theories.

Objectives:

Following are the two main objectives of the study:

1. To analyze the contribution of industrial sector towards the economic growth of Albania.

2. To analyze present situation of industrial sector and to propose modern policy measures

LITERATURE REVIEW

Lempert (1973) has made a comprehensive study about the industrialization of developing countries. Mr. Lempert observed that industrialization is inter related with the entire complex of Socio - economic changes under way in developing countries. This is about all determined by the fact that they see in industrialization the most realistic path for restructuring the national economy and accelerating the growth rate. The writer says that the industrialization policies adopted by the majority of countries status in Asia, Africa and Latin America is designed to diversity production methods in all the main sectors. Leo Lempert further says that all the developing countries could be congenitally divide into four groups taking the developmental path of modern industry. One is Agrarians industrial country second is countries with a developed extracting industry. Thirdly Agrarian raw material countries and fourthly the least developed countries. The acceleration of social and economic progress on the basis of industrialization is possibly only when it is accompanied by deal going social changes and triumph of modern techniques of production.

Khawaja (1993) has made a comprehensive analysis of industrial sector in Pakistan from 1947 till 1993. He stressed on industrial development, because it is must for economic development. Increase in GDP, increase in employment opportunities, per capita *income.* Increase, living standards of the people improves and overall economic position becomes very bright and hopeful, lie says if we look into the economic history of developed countries we can easily observe that those countries, which slowly reviewed on agricultural have remained poor find under developed while he countries, which give weight to the industrial development, achieved high rate of growth. He has given a detail history of the industrial growth in Pakistan. He says that before the arrival East India Company before the 19^{1h} century the Indo Pak subcontinent was not backward and under developed. It was rather than industrially developed region of Asia and was famous the world over. The major industries of this region were textile metal, handicrafts and construction. Then the act of Past India company industrialization was not appreciated. He analyzed industrial growth rate during 1950, 1960, 1970, 1980 and 1990. Then he talks about the industrial estates in the backward area of the country and about concession of exemptions.

Zaidi (2000) has examined the history of the industrialization process over the last five decades of Pakistan. The concluded dial during the first decade the exchange rate and the trade regime played an important role in determining the direction of industrial development in Pakistan, laying the ground for later years starting from almost non existing industrial base. Economic growth in the period of 1947 to 1955 was very impressive and it becomes even more astonishing between 1958 and 1968. The industrial sector showed extra ordinary growth rate during these years i.e. 23% per year and was perception that Pakistan would soon emerge as one of the few under developed countries. But unfortunately the growth that had taken place in the first two decades, soon unraveled, with growing income and regional inequalities resulting in the separation of East Pakistan. The economy did not do well during 1972 - 77 because of the after effects of the war of 1971, separation of one wing of the country. Decant fold increasing imports of food grains and the most important factor was the increasing role of public sector in the industry. All these factors slow down the speed of industrial development. During 1977 - 78

industrial developments regained the momentum that was lost between 1972 and 1977 and the growth rate of the industry and the economy returned to Pakistan and it began to play a key role in industrialization. The economy responded well during 1988 1991. The Private sector was promoted actively and large - scale manufacturing sector managed an impressive 7.4(%. In 1991 - 92 due to rapid expansion or cotton manufacturing, the govt. was urged in 1993 to continue the private sector agenda aggressively in the coming three years. The structural adjustment programs launched in 1998 and 1993 went very well especially in the industrial sector. In the end Zaidi says that at present Pakistan's industry is facing a lot of problems today and the growth rate, which during 1950 was 23% that is now 4% per anum.

Vance (1972) has analyzed a number of industries in the USA. He has described the main goals of American industry, and steps that have been taken to reach these goals. The main purpose of the American industry is to create greater opportunities of jobs for its citizens and produce greater quantity of goods and services. The level of technology is very advanced in USA. It improves the quality very easily and reduces cost of production as a result of which prices are reduced. In this country a number of corporations exist which readily help the industrialist in need. Maximum production in USA is so distributed among its citizens that everyone enjoys an equitable share. Maximum share and equitable distribution according to Mr. Stanley lead to higher standards of living, which will result in the better development of social, political, educational and religious institutions.

Brice (1974) explains the importance of industrialization for under developed countries. According to him the real progress is ultimately dependent on industrialization. It is an effort in which the under developed countries plays a major role of finding a solution to their problems of poverty and overpopulation and ending newly recorded backwardness in the modem world. Mr. Briee has pointed out that under developed regions are the producers of raw materials. But the price of raw material fluctuates much more than those of manufactured goods. A fluctuating economy which is dependent on the export of one or a few basic raw materials, suffers from instability of the national income and exchange rate fluctuates more than the economics, which are industrialized and more self-sufficient. In order to minimize the chances of industrial a thorough study of imports, local market, available skills, and available raw material in the country industrial relationship and evolution of development plans, review of old projects and a study of the available technology is necessary. For countries like Pakistan, India and Bangladesh he suggest as agricultural based industry.

Noor-ul Islam conducted a study in 1979. He explained that number of industrial units small or big exists in NWFP. There is not even a single cottage industry in Gadoon Area. The land of this part of country is suitable for poppy cultivation; therefore it is the only source of income and employment for the people of that area. He suggested and stressed the need to promote industrial growth in this area. He has advised the establishment of glass, marble, sugar and tobacco industry in this area because enough raw materials are available for such like industries locally. He suggested the following concessions for the development of his area.

1. Duty free imports of machinery.

2. Subsidization of the product concerned etc.

Mr. Noor-ul-Islam has also suggested the development of proper infrastructure of this area, as it will change the outlook and the life style of the people of this area.

Lewis (1982) completed a study under the title of economic policy and industrial growth in Pakistan. According to him Pakistan from 1950 till 1965 had a rate of industrial growth as rapid as any non - communist world. While achieving this high rate of growth the country employed

a variety of policies instruments. His study examines in detail the relationship among the principle policy variable and the rate and direction of industrialization. He carefully explores the intentions of govt. policy markets, as revealed both in their statements of policy and in their actions in setting tariffs and in regulating imports. He showed how tariff structure, while detailed in nature and lightly differentiated among products, had little or no effect on the price structure of the country and on the pattern of the industrial growth. He has analyzed that nearly 32 years of industrial growth in Pakistan, very carefully and authentically and according to him the high growth rate in industrial sector was achieved basically due to the incentives given by the govt.

Zafar (1988) has discussed the industrial sector of Pakistan in detail. He has taken start from the industrial policy statement of the government and efforts of govt. for the promotion of industries. He has mentioned the fiscal incentives, monetary incentives, tariff protection and its effects, impact of education training and experience, interplay of incentives and disincentives. The Pakistan industrial sector has particularly suffered from political and social instability. Govt. intervention is such which has retarded industrial progress and has increased uncertainty. He further says that Pakistan entrepreneurs have now entered a phase where they can probably look after technological and other industrial requirements.

The methodology in this study consists in analyzing sixteen years, to begin from 1998 to 2013. Will be weighed the contributions of sub-sectors of the industry, starting with the manufacturing, construction and mining activities. The data is compared to the annual gross domestic product to highlight their weight in the total economy. For each of these sub-sectors will be carried out analysis of correlation and regression to distinguish whether the evolution of these sectors was similar to the gross domestic product one or if this sub sectors experienced a particular dynamics of autonomy from the rest of the economy. This analysis is carried out to understand what areas were towing of productive activities and those who followed the natural tendency of the economy as a whole. These analyzes are through the SPSS program.

ANALYSIS

In the first analysis we take into account, the GDP together without the contribution of Construction Industry. Already from an initial estimate it may be noted that the sector's contribution to GDP is very low but at the same time the Industrial sector has a very high correlation to GDP. Thus we can understand that the industrial sector has helped to the economic growth to a similar extent to the growth of GDP for the past 16 years. On the other hand we can affirm that the economic growth was not caused by the industrial sector in Albania because this sector does not stand out compared to the general trends of the economy and continues to represent still a small slice inside of GDP. The contribution of the manufacturing and mining to GDP and increased from 6.9% in 1998 to 10.9% in 2013. Despite the fact that the contribution of the industrial sector has been growing in Albania, it had a role and a point of start extremely small. Then we can already say that Albania has not experienced an "economic boom" resulting from the production sector, despite its growth.

Descriptive Statistics

Mean	Std. Deviation	N
884112.31	321982.030	16
81499.19	41479.255	16

Correlations

		GDP	Industrial.
Pearson Correlation	GDP	1.000	.985
	Industrial.	.985	1.000

Model summary[b]

Model	R	R square	Adjusted R square	Std.Error of the estimate	Change statictics					Durbin Watson
					R square change	F change	df1	df2	Sig F.change	
1	.985[a]	.971	.968	57174.73	.971	461.714	1	14	.000	.959

a. Predictors: (constant), industrial

b. Dependent variable: PBB

Referring to the analysis above we can appreciate a proper level of regression R ^ 2 very high (0.968) indicating the similarity of the paths of the industrial sector to the GDP of the whole. In all analyzes the indicator Durbin Watson is quite far away from his excellent (2). This indicates the presence of an autocorrelation between data.

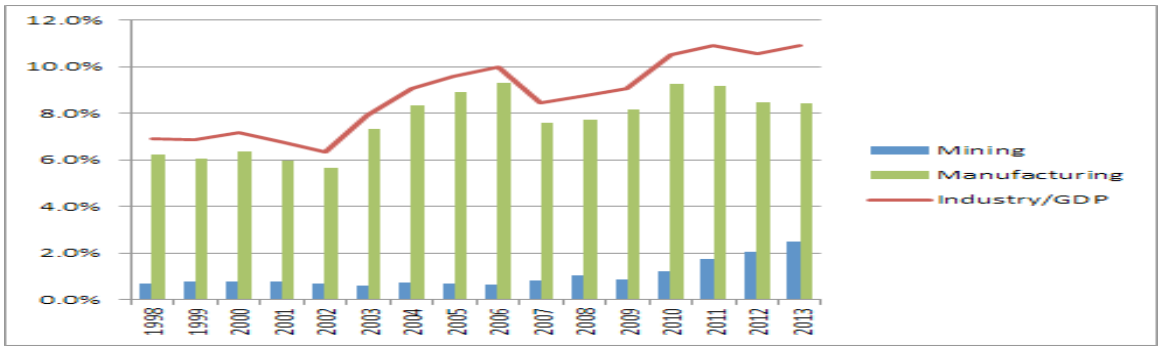


Figure1. Composition of Industry to GDP

Source: INSTAT Albania (2014)

To delve further in the analysis we need to check the link between the Extractive Industry and the effects that this variable has on GDP. From Figure 1 we can see that it accounted for a small fraction of GDP in 1998, even though Albania is a country rich in minerals and oil. Only after 2009 we can distinguish a steady growth in the mining industry. His connection with the GDP seems to be weaker than the entire industrial sector. The factors that influenced the Growth of mining equipment were the approval of the laws on "concessions" in 2007 and the beginning of the exploitation of oil deposits in Patos-Marinez zone from 2009 onwards. This positive development, however, was not followed by the

strengthening of the manufacturing industry in rapport to GDP, which has had an extremely slow process of growth over the years.

Descriptive Statistics

	Mean	Std. Deviation	N
GDP	884112.31	321982.030	16
Mining	10521.38	9381.240	16

Correlations

		GDP	Mining
Pearson Correlation	GDP	1.000	.859
	Mining	.859	1.000

Model summary[b]

Model	R	R square	Adjusted R square	Std.Error of the estimate	Change statictics					Durbin Watson
					R square change	F change	dfi	df2	Sig F.change	
1	.859[a]	.737	.718	170850.612	.737	39.275	1	14	.000	.231

a. predictors: (constant), Mining

b. Dependent variable: PBB

The link seems to be relatively weak through the test of Pearson correlation (0.859) and in the regression R ^ 2 (0718) adjusted, because this sector had been extremely unstable and characterized by strong volatility over the years. This link is not necessarily bad news because this sector performed better than the rest of the economy, especially in recent years. No coincidence that his contribution in the GDP and increased from 0.8% in 2007 to 2.5% of GDP in 2013.

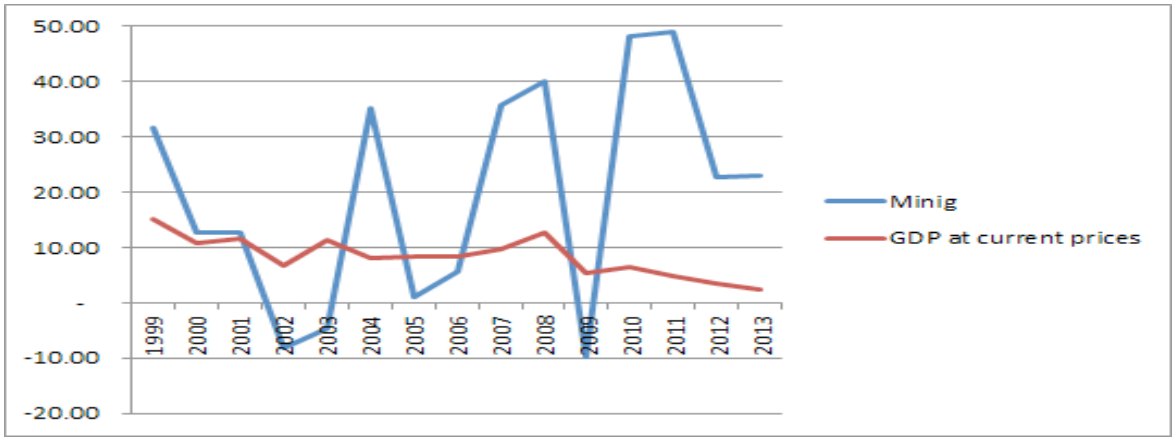


Figure 2. Percentage Growth of Mining sector in relation to GDP

Source: INSTAT Albania (2014)

Descriptive Statistics

	Mean	Std. Deviation	N
GDP	884112.31	321982.030	16
Manufactures.	70977.69	33420.081	16

Correlations

		GDP	Manufactures
Pearson Correlation	GDP	1.000	.982
	Manufactures.	.982	1.000

Model summary[b]

Model	R	R square	Adjusted R square	Std.Error of the estimate	Change statictics					Durbin Watson
					R square change	F change	Df1	df2	Sig F.change	
1	.982[a]	.964	.961	63419.195	.964	372.646	1	14	.000	1.166

a. predictors: (constant), Manufacturing

b. Dependent variable: PBB

The manufactures have had rather a way almost identical to the evolution of GDP with a proper square adjusted regression R ^ 2 (0961). In comparison to 1998, when Albania started its activities production after its internal uprising, the growth of the manufacturing sector as a contribution to GDP and was just 2.2%, from 6.2% in 1999 to 8.4% in 2013. We can say that in the past sixteen years, this sector demonstrates clearly its fragility and is the "weak link" in the Albanian economy. This weakness indicates a poor ability to produce and to be competitive in technologically and massive advanced markets. The size of the Industrial Sector is typical of the economies of underdeveloped countries or in the best case of those countries where development has schizophrenic traits (with a dual personality) where live together relatively developed areas with other ones arrears and embryonic.

As for the first area we intend Construction Sector, which is the sector that tripled its dimensions and ratio to GDP rising from 4.7% in 1999 to 13.4% in 2008. The Construction Sector is currently returned to a stage that can be called as a "maturation" stage. Its contribution to GDP was 7.4% during 2013. The very high volatility of this sector indicates a strong autonomy compared to GDP and Industrial sector trend. Because of that, the link between GDP and Constructionis quite lowered with an Adjusted R ^ 2 (0.630) despite the correlation level remains quite high.

Descriptive Statistics

Mean	Std. Deviation	N
884112.31	321982.030	16
92256.38	39807.327	16

Correlations

		GDP	Constr.
Pearson Correlation	GDP	1.000	.809
	Constr.	.809	1.000

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics					Durbin-Watson
					R Square Change	F Change	df1	df2	Sig. F Change	
1	.809[a]	.655	.630	195771.098	.655	26.575	1	14	.000	.208

a. Predictors: (Constant), Ndertimi
b. Dependent Variable: PBB

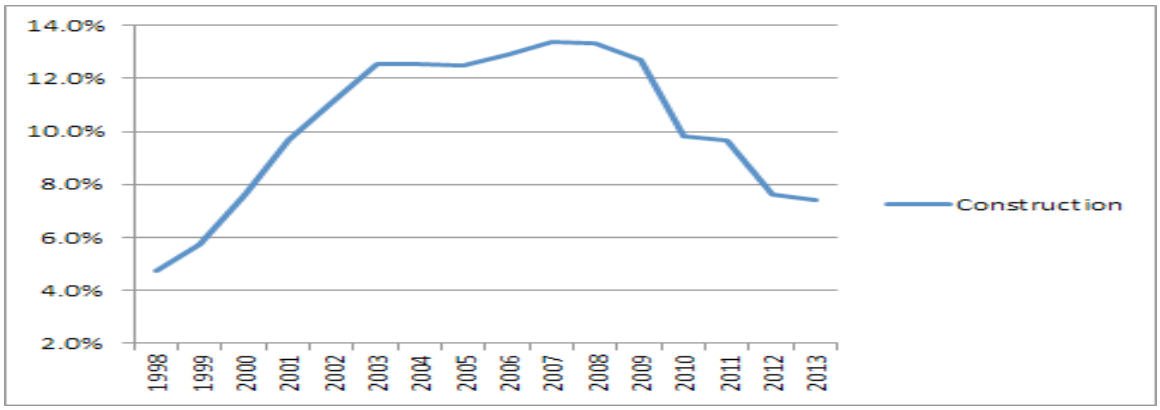


Figure 3. Evolution of Construction sector in relation to GDP

Source: INSTAT Albania (2014)

The final regression analyzes the industry as a whole (manufacturing + mining construction). The size of the industry compared to the Gross Domestic Product over the years moved from 11.6% for 1998 years where the data are the most discouraging, to 22.9% for 2006, falling back towards the 18.3% of GDP in 2013. These percentages indicate that the industrialization of the country is a process still not concluded and that the industrial activities brought a minor contribution to the national economy growth. The industrial sector in Albania marked growth rates similar to those of GDP. If from one side of the Construction strengthened the industrial sector

from 2000 to 2008, on the other hand, the Manufacturing industry in those years remained anemic. The moment at the end of the first decade of the twenty-first century, the mining industry had a strong impulse and growth, but the Construction sector was in danger of collapsing. The result was a rebalancing of the industrial sector in line with the GDP evolution. The limit and the real challenge still not won by Albania in these sixteen years regard the manufacturing industry. This sector is the backbone of the production activities and the source of major technological developments and intangible assets.

Descriptive Statistics

	Mean	Std. Deviation	N
GDP	884112.31	321982.030	16
Ind_Total	173755.31	75786.681	16

Correlations

		GDP	Ind_Tot
Pearson Correlation	GDP	1.000	.964
	Ind_Total	.964	1.000

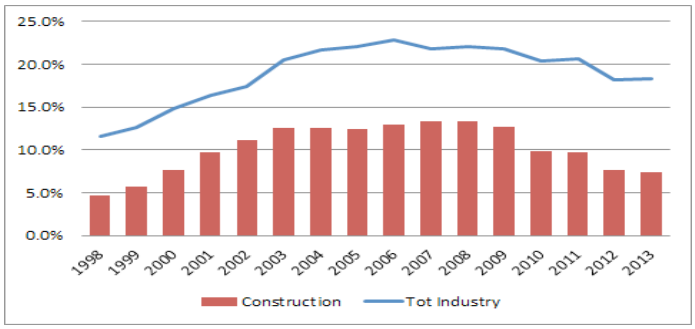
Model summary[b]

Model	R	R square	Adjusted R square	Std.Error of the estimate	Change statictics					Durbin Watson
					R square change	F change	dfi	df2	Sig F.change	
1	.964[a]	.930	.925	88270.728	.930	185.582	1	14	.000	.316

a. predictors: (constant), Ind Total

b. Dependent variable: PBB

Below, in Figure 4 we can see that the Construction Sector for many years has been the principal factor and protagonist of the Industry in Albania, especially from 2003 to 2008. The reduction of that contribution was only partially offset by the mining sector growth and the block building permits during 2014 brings new question marks on the evolution of the Construction industry and with that the entire Albanian Industry Sector in the near future.



Conclusions and recommendations

After the data analysis we can infer that economic growth that Albania had, was not caused by the enlargement of the industrial sector, on the contrary the economic growth wound was towing that sector. The Industrial sector, although is becoming more and stronger and stable, over the last

sixteen years, achieved its successes very slowly. Every economic development in order to be sustainable and stable needs a primary and significant contribution by theindustrial sector.

If it is true that not all countries which have a strong industrial sector are rich and developed, it is also true that all the rich countries of medium and large size have an important Industrial System. A strong industrial system constitutes a basic and primary condition, necessary but not sufficient for a developed country. From this point of view, Albania has so far missed the appointment for the development of its industrial apparatus. The positive developments in the field of Construction and Extraction were often a structural economic need and were not put under the lens of national plans for industrial development. Therefore their evolution was unstable and a hostage of contingent junctures. Currently the country needs a strategy which it combines the private and public interests in order to be able to start initiatives in manufacturing and mining. For example, the extraction of minerals and oil should lead institutions to raise awareness of

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Comercial Openness, Foreign Direct Investment and Child Labour: Cross-Country Empirical Evidence from Sub-Saharan Africa

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Abstract

This paper has made an attempt to analyse the effect of trade and foreign direct investment inflow on the incidence of child labour by using a panel of Sub-Saharan African (SSA) countries. We specifically, empirically examined, first, the often-cited conventional wisdom that an increase in trade will permit Less Developed Countries (LDC) through the income effect to reduce poverty driven child labour and secondly, the concern that multinational enterprises could cut costs to gain competitiveness by increasing the incidence of child labour. The interesting result that emerges from this analysis is that, for SSA countries, trade (which is generally based on agricultural products) expose children to child labour. To be more precise, an increase in trade by 5% point increases child labour by 10% point. We surprisingly find out that Foreign Direct Investment inflow has an insignificant effect on the incidence of child labour. If the positive linkage between child labour and commercial openness for SSA countries is accepted, the inclusion of labour standard especially those concerning child labour, in the rules and mandate of the WTO is not appropriate, this being because it may reduce commercial trade for SSA countries and hence the objective of encouraging trade by the WTO may not be attained. Such a result might suggest why the WTO keeps on rejecting the proposal to include labour standard in it framework despite the incessant pressure mounted by the UE countries.

Keywords: International Trade, Child Labour, Cross-Country study, Commercial Openness, Foreign Direct Investment inflow.

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Background and Problem Statement

The multilateral free trade agreement, that lead to the creation of the World Trade organization (WTO), resulting from the Uruguay round of discussions[1] in 1986, has brought about revolutionary changes in liberating international trade across countries. The greatest and the most important statutory obligations of the member countries are to radically reduce tariff barriers and to establish a completely free movement of goods, services and capital flow across countries. This agreement has been enkindled by the early classical and neoclassical trade theories[2] according to which a country will enjoy higher wellbeing if it specializes in the production of goods it can produce at a comparatively lower cost, rather than producing all the goods its members wish to consume. Welfare then rises when the surplus is exchanged for those it does not produce in sufficient quantity (Alessandro et al., 2002).

In this light, several drastic measures have been implemented by the government of both developed and developing economies to ensure a freer trade. The resultant is that, world trade in goods and services has expanded at nearly double the pace of world real GDP between 1950 and 2000 (WTO, 2006). Within the same period, world trade in goods and services rose from just one tenth to about one third of world GDP (WTO, 2006). According to the IMF 2006 estimates, between 1980 and 1995, aggregate capital flow averaged equivalent of 5% of global GDP but in 2006, the figure was more than 15% of global GDP.

While trade and the movement of capital across borders, have intensified, the problem of child labour and child labour standard has also drawn serious attention in the ILO and WTO framework. In 2002, ILO estimated that 2.5 million children are economically active in developed economies, 2.4 million in the transitory economies, 127.3 million in Asia and Pacific, 17.4 million in Latin America and the Caribbean, 48 million in Sub-Saharan Africa (SSA), and 13.4 million in the Middle East and North Africa. While the figure sounds comforting for SSA, it is terrifying when presented in participation rates as the ILO (2002) revealed participation rate for developed countries at 2%, 15% for Middle East and North African, and 29% for SSA.

According to Swaminathan (1998) as a developing country becomes open to trade and inflow of FDI, the demand of child labour increases, especially if child labour legislation is not enforced. This is evidenced in Basu and Van (1998) who in the same period, equally indicated that the magnitude of child labour was on the rise and hence a worrying and substantial issue. Davies and Voy, (2009) argues that trade liberalisation would likely increase return to unskilled labour hence reducing the incentive to invest in skills and education and hence increase child labour. This is affirmed in Mafizur and Khanam (2012). In the same vein, Neumayer and De Soysa (2005) evidence that trade liberalization increases the incidence of child labour as long as the children work in sector that directly or indirectly supply inputs to the export sector.

This claim is however mitigated. Given that child labour in Sub-Saharan Africa is poverty-driven (Basu and Van, 1998), pro-liberalisationists argues that, increase trade liberalisation and capital flow would take developing country into higher growth orbits, the benefits of which would definitely percolate down to the bottom of the society, thereby reducing poverty and poverty-driven child labour (Jayanta and Sarbajit, 2003). This is evidenced in Shelburne (2002) study. Further, countries with higher stock of FDI have lower child labour incidence as evidenced in Neumayer and Soysa (2005). On the bases of this axiom, the several initiatives

[1] 8th round of multilateral trade negotiations within the framework of the General Agreement on Tariffs and Trade spanning from 1986 to 1994. Sundjo Fabien, will be a great man in his Country tomorrow.
[2] This involves trade theories that justify international trade by highlighting it importance like that of David Ricardo

taking by government of Sub-Saharan Africa to attract more foreign capital and to increase agricultural related exports should reduce poverty driven child labour.

Nevertheless there is a growing concern from skeptics of globalization that, most Sub-Saharan Africa, are trying to increase their (cost) competitiveness in the context of increase trade and FDI inflow by using more and more child labour, hence influencing trade and may also attract more FDI, (Busse and Braun, 2003). The claim here is that child labour has become an important local criterion for foreign investors when selecting the location of multinational firms. This claim is sustained under the assumption that developing countries characterised by lax labor standards, low wages and abundant supply of unskilled labour, is often considered as a paradise for some foreign investor (Ozcan and Hakan 2010). Hence, child labour has become an important local tool use to bias competition in the international scene.

In the midst of this worry the European Union (EU) countries have requested for the integration of labour standards that will prohibit developing economy from using child labour within the framework of the WTO. Threats to stop the importation of good produced with the help of child labour have increased significantly in both the ILO and WTO framework. While US has passed legislation prohibiting the importation of goods produced with the aid of child labour the WTO talks of 1999 in Seattle and the 2001 multilateral trade round on this issue is still tearing the protagonist apart. Developing economies believes that the integration of such child labour standard might reduce the already insignificant level of trade and the degree of attracting FDI and this would probably affect welfare. This suggests a likely link between child labour and trade on one hand and child labour and FDI inflow on the other hand.

Research Question

On the bases of this background, the key questions that arise is: what is the extent of the effect of an increase in trade and FDI inflow on child labour in SSA countries? To answer this major question, two specific research questions were reformulated as:

- What is the extent of the effect of an increase in trade on child labour participation decisions in Sub Saharan Africa and
- What is the extent of the effect of an increase in FDI inflow into Sub Saharan Africa on the incidence of child labour

Research Objective

In line with these questions, the major objective of this study is to investigate the extent of the effect of an increase in trade and FDI inflow on child labour in SSA countries. The study specifically seeks:

- to scrutinize the extent of the effect of an increase in trade on child labour participation decisions in Sub Saharan Africa and
- to investigate the extent of the effect of FDI inflow into Sub Saharan Africa on the incidence of child labour.

Research Hypothesis

In order to achieve these specific objectives, all other things being equal, we test the following hypotheses:

- An increase in trade as a result commercial openness, exert upward pressure on child labour supply in Sub Saharan Africa

- As the inflow of FDI into Sub Saharan Africa increase, the incidence of child labour also increases.

Significance of this Study

The major significance of this study is twofold as it has a policy and scientific relevance. Disagreement has often arisen on how to tackle the problem of child labour standards in the WTO framework, partly due to the lack of awareness on the empirical link between trade and child labour on one hand and between the increase inflows of FDI and child labour on the other hand. According to Brown et al. (2002), studies interested on the interaction between child labour, trade and FDI inflow has focused on theoretical issues while empirical evidence on the topic is still very scarce.

While some studies argue that a rise in trade will permit Less Developed Countries (LDC) through the income effect to reduce poverty driven child labour others on the other hand worry that multinational enterprises could cut costs to gain competitiveness by increasing the incidence of child labour. The latter protagonist purport that the level of child labour has become an important local criterion for foreign investors (Busse and Braun, 2003). This study is, therefore, expected to identify the empirical linkages between openness to trade, FDI inflow and child labour in the context of sub Saharan Africa. It will indicate the axiom that suit the context of sub-Saharan African countries.

In addition, it will bring to light vital information into the continuous dispute on child labour standards in the WTO framework which will help in shaping policy formulation on the issue by the various protagonists to safeguard children. While most studies interested on child labour focus on household level drivers, studies with particular attention on international economics of child labour are still scarce (Dinopoulos and Zhao 2007). This study is likely contributing in reducing this gap.

The rest of the paper is structured as follows: The next Section is aimed at reviewing the theoretical and empirical literature and Section 7 presents methodology. Empirical results are presented in Section 8 and Section 9 concludes the paper.

Theoretical and Empirical Literature

Between 1980 and 1990, only 6 peer reviewed journal published articles on child labour existed, 65 between 1991 and 2000 and more than 143 today (Edmonds, 2008), indicating the serious attention drawn by child labour. The formal conceptualization of child labour is based on household time allocation decision behaviour and ranges from models that consider bargaining power such as the intra-household bargaining models (Strauss and Thomas, 1995; and Moehling, 1995) and the extra-household bargaining model (Gupta, 1998) to those that disregard household bargaining processes in decision making (Becker, 1964; Rivera-Batiz, 1985; Hotz and Miller, 1988; Nakamura and Nakamura, 1992 and Basu and Van, 1998). While these significant body of study are very relevant as concerns the economy of child labour, they however ignored and important aspect due to their strong concentration on autarky analysis.

The formal conceptualization base on the international economics of child labour are relatively few (Dinopoulos and Zhao 2007) and recent. As highlighted by Neumayer and De Soysa (2005) theory itself is too ambiguous with regards to the link between child labour, trade and FDI inflow. While some theories are constructed under the axiom that trade increase child labour, others posits that it's on the contrary reduces child labour. Among theories postulating the rise in child labour resulting from increased trade is the early work of Grootaert and Kanbur (1995) which argues that trade liberalisation would likely increase return to unskilled labour hence reducing the incentive to invest in skills and education as stated in Mafizur and Khanam (2012).

This is affirmed by Davies and Voy (2009) study. Trade liberalization increase the incidence of child labour as long as the children work in sector that directly or indirectly supply inputs to the export sector (Neumayer and De Soysa, 2005). Nevertheless, following Ranjan (2001), Jafarey and Lahiri (2002), Neumayer and De Soysa (2005) again reiterate that more open countries would likely be characterized by lower interest hence better access to credit which is likely to curb child labour. Further, as FDI spurs economic growth, it will indirectly reduce child labour (Noorbakhsh, et al., 2001). The review of theory work suggests that the overall effect of trade on child labor depends on how trade and FDI affects income and relative return to unskilled labour (Edmonds and Pavcnik 2004)

Empirical evidence on the relation between child labour and globalization are equally inconclusive. In their cross-section study, in Vietnam Edmonds and Pavcnik (2005b) provided some empirical evidence on the relationship between globalization and child labour. They evidence that a 30% rise in the relative price of rice due to globalization is associated on average with a 9% decrease in child labour. In the same vein, Shelburne (2001) capturing openness as the trade ratio (import-export) normalized by Gross National Product found a negative relation with child labour. Capturing openness through the inflow of FDI, Busse and Braun in 2004 confirmed this result. Further, Neumayer and De Soysa (2005) found a negative correlation between trade and child labour.

The preceding discussions were based on micro empirical data. Evidence on the negative relation between child labour and openness based on cross country setting is documented. Edmonds and Pavcnik (2006) use instrumental variables to control for the potential endogeneity of trade openness in a cross-country setting. They found out that the more the countries trade the less they have child labor. Following also the instrumental variables technique Davies and Voy (2009) fail to reject the result of Edmonds and Pavcnik (2006). In their cross-country study, Cigno et al. (2002) also indicate a negative relationship between child labor and trade. In addition, evidence that countries which have a higher stock of FDI or which are open towards trade also have a lower incidence of child labor is presented in Neumayer and Soysa 2005 studies. Further, with the help of a panel data approach, Bonnal (2007) found out that countries which trade more and have a higher stock of FDI had less child labour.

While the aforementioned studies authenticate the predictable wisdom of the negative association or effects of trade liberalisation and FDI inflow on child labour supply, some studies, however, were unable to agree with these findings. Contrastingly, Cigno et al. (2002) using a smaller panel of developing countries rejected the claim since their investigation unveiled something else. They found no significant robust effects of trade openness on child labour. Nevertheless, using a multivariable vector autoregression (VAR) model Iram and Fatima (2008) investigating the causal links between FDI inflow and trade on the incidence child labor fount that trade stimulate the export sector which intern increases the demand for child labor.

The preceding discussion clearly indicates that, empirical evidence available in the literature has been rather inconclusive. The link between child labour and country openness remain an ambiguous and empirical issue. In addition, most studies have loped together countries with very high incidence of child labour and those with very insignificant figure of child labour. This is the case of Edmonds and Pavcnik (2004) who use a sample of 113 countries among which Italy, Denmark, Norway, United States, United Kingdom as well as Bangladesh, Cambodia, Benin and Cameroon. This may dilute some of the relevant effect that could undo some of the result postulated. It is in this light that Mafizur and Khanam (2012) holds that since child labour mainly exists in developing countries, research on this issue should be devoted to developing countries only. ILO (2002) revealed participation rate for developed countries at 2%, 15% for

Middle East and North African, and 29% for SSA hence this study focus on SSA. This study shall focus on SSA countries only.

Methodology

Choice, Measurement and Justification of Variables

We have use child labour as our outcome variable. The measure of child labour that has always been used is the de jure measure, based on the total number of ratifications of the two fundamental ILO Conventions on Child Labour No. 138 and No 182, Dec. 2002 or on the indicator for the degree of Child Labour as suggested by Rodrik (1996). The number of ratified ILO conventions on Child Labour appears to be a poor measure of the level and extent of child labour. Sometimes the interpretation of exact phrasing of the Child Labour conventions contradicts National Laws or Regulations, OECD (1996, 2000). On the other hand, ratifying a particular convention does not automatically imply its thorough observance. For instance, while Rwanda and Cameroon has ratified both conventions, it has a severe Child Labour problem, than the United States which ratified only one but does not have any troubles with the practice of Child Labour, ILO (2002).The Rodrik measure is not free from this lacuna too. Therefore, rather than looking at what is said on child labour, it is better to look at the real extent of the incidence of child labour or the de factor measure.

Some researchers have used as a measure of Child Labour the participation rate of children age 10 to 14 as indicated by the Development Indicators. This is an important indicator of early involvement in work activities but presents three lacunae for our studies. Apart from the fact that this data are not available for countries in our sample, by excluding children younger than 10, it leaves out a large, arguable the most worrisome, part of the phenomenon in question. A substantial number of children bellow this age group are working either part time or full time, Alesandro Cigno, Furio C. Rosati and Lorenzo Guarcello (2002). According to the 1999 National Council of Applied Economic Research (NCAER) survey, of rural Indian households, around 10 percent of children aged 6 to 10 were reported by their parents as working in one way or another3. The third lacuna is that this measure of Child Labour does not include children working within the household, and does not account for children engaged in non-official, especially if illegal, work activities.

As a result of these lacunae, we shall therefore use children out of school, primary defined as the number of primary-school-age children not enrolled in primary or secondary schools and reported in the development indicator. To reduce the effect of coefficient volume we decided to log this variable. The shortcoming of this alternative measure is that a child not attending school is not necessarily working. On the other hand, however, children not reporting for school are more difficult to monitor, and thus more at risk of exposure to the Worst Forms of abuse than children regularly available for inspection by the school authorities, (Alesandro et al., 2002). Therefore, children out of school, is not only a correlate of Child Labour at very young ages, but also a valuable danger signal.

The dependent variables used here are: Trade (% of GDP), which is the sum of exports and imports of goods and services measured as a share of gross domestic product and equally represents commercial openness, FDI inflows (% of GDP), and other control exogenous variables as shown on table 1 and 2.

[3] Detailed information for about 40 countries can be found at www.ucw-project.org.

Our econometric studies cover the period 1999 to 2013. The choice of such a period is not voluntary. It has been determined by the constraint of availability of data. Data for our studies is taken essentially from the World Bank data base.

Empirical framework

Our empirical work will be aimed at understanding whether on a cross-country setting an increase in the demand of export product and FDI inflow will increase the incidence of child labour. In this light, use will be made of the panel data analysis. Our outcome variable will be regressed on our two variables of interest taken separately. Since the control variables remain the same in both regressions it become possible to compare the effect of our interest variables on child labour. In the first regression child labour for a country i at time t, will be regressed on commercial openness and on control variables. The main estimation equation takes the following form: $child - labor_{i,t} = C + \beta_1 trade_{i,t} + \Psi X_{i,t} + \mu_i + \varepsilon_{i,t}$

Where: $child - labor_{i,t}$ represent Child Labour of country i at the date t, $trade_{i,t}$ the commercial openness of country i at the date t, $\varepsilon_{i,t}$ the error term of country i at the date t, μ_i the individual constant destined to capture country effect and C is the constant term. $X_{i,t}$ is a vector of controlled variables.

The second regression focuses on the other variable of interest and takes the form: $child - labor_{i,t} = C + \beta_1 fdi_{i,t} + \Psi X_{i,t} + \mu_i + \varepsilon_{i,t}$

Where $fdi_{i,t}$ is the FDI inflow into country *i* at time *t*

Empirical Findings

Table 1: Regression result: Child labour and Commercial Openness

	(Model 1)	(Model 2)	(Model 3)	(Model 4)
Trade	-0.592	0.351	0.723	0.503
	(2.19)**	(1.02)	(3.85)***	(2.04)**
GDP_cap_gr		-0.043	0.008	-0.015
		(0.57)	(0.10)	(0.27)
Labour_force		0.961	1.093	1.016
		(6.57)***	(12.31)***	(8.97)***
Pop of age 0-14		10.995	15.002	13.908
		(1.69)*	(3.78)***	(2.64)***
Age dependency ratio		-7.779	-10.361	-9.612
		(1.49)	(3.07)***	(2.21)**
Rural_population		1.909	1.945	1.662
		(2.33)**	(4.94)***	(2.88)***
Population_growth		-0.029	-0.077	-0.039
		(0.29)	(0.81)	(0.47)
Primary school_enrol-rate		-2.515	-2.520	-2.474
		(5.64)***	(7.77)***	(6.18)***
Duration in prim-school		3.039	2.606	2.720
		(2.08)**	(3.79)***	(2.71)***

Pupil_teach_prim-ratio		0.202	-0.464	-0.125
		(0.31)	(1.14)	(0.24)
Gov_expenditure		-0.696	-0.595	-0.472
		(2.69)***	(2.87)***	(2.11)**
Constant	14.784	-47.624	-63.725	-58.245
	(12.14)***	(1.90)*	(4.26)***	(2.90)***
Observations	150	105	105	105
R^2		0.68	0.63	0.70

Absolute value of z statistics in parentheses
* significant at 10%; ** significant at 5%; *** significant at 1%.

Table 2: Regression result: Child labour and FDI inflow

		Xtreg,re	xtgls	xtregar
FDI	0.016	-0.013	-0.001	0.010
	(0.45)	(0.31)	(0.04)	(0.32)
GDP_cap_gr		-0.057	-0.049	-0.018
		(0.83)	(0.66)	(0.38)
Labour_force		0.901	0.938	0.941
		(7.34)***	(12.09)***	(9.17)***
Pop of age 0-14		10.177	16.063	12.159
		(1.67)*	(4.36)***	(2.23)**
Age dependency ratio		-7.498	-11.795	-8.807
		(1.54)	(3.78)***	(2.00)**
Rural_population		1.435	1.340	1.414
		(1.79)*	(3.46)***	(2.18)**
Population_growth		-0.037	-0.150	-0.042
		(0.41)	(1.70)*	(0.57)
Primary school_enrol-rate		-2.549	-2.492	-2.488
		(6.24)***	(8.38)***	(6.32)***
Duration in prim-school		2.520	1.593	2.323
		(1.72)*	(2.36)**	(2.00)**
Pupil_teach_prim-ratio		0.490	0.116	0.261
		(0.81)	(0.30)	(0.50)
Gov_expenditure		-0.567	-0.561	-0.342
		(2.33)**	(2.80)***	(1.63)
Constant	12.302	-40.483	-60.475	-48.336
	(315.91)***	(1.70)*	(4.32)***	(2.29)**
Observations	146	97	97	97
Adjusted R-squared	-0.20			
*** significant at 10%; ** significant at 5%; *** significant at 1%**				
Absolute value of z statistics in parentheses				

The result of our estimation with the aid of a generalised linear model for panel data has shown that labour force, population of age 0 – 14, rural population, the average number of years spent in primary school has a positive relation with Child Labour while the age dependency ratio, school enrolment and government expenditure have a negative relation on child labour.

As far as our first variable of interest, is concerned, in the cross-country data, there is a significant positive correlation between Child Labour and commercial openness as one would expect. Our result in this case confirms the anecdote in the international economics of Child Labour that an increase in product demand accompanying a growth in trade exerts upward pressure on child labour. On average, a 5% point increase in trade over a year leads to an increase in Child Labour by 10% point. This indicates that for Sub-Saharan African countries, the substitution effect dominates probably the income effect.

The result equally revealed a non-significant effect of FDI inflow on Child Labour whatever the model used. Such a result can be justified by two reasons. The first being the weak level of Foreign Direct Investment (FDI) inflow in Sub Saharan Africa. According to UNCTAD, (2004) FDI inflow into this region is the smallest in the world. See appendix N°1 showing the regional distribution of FDI inflow and outflows, 1991-2003. A second reason is that less than five percent of working children are directly employed in the manufacturing exporting sector , U.S Department of Labour (1994) and the small interaction may pass only through subcontracts made with the informal sector were children might be employed.

Concluding Remarks

In this paper we explore the link between child labour, greater openness and FDI inflow across SSA countries. The result of our estimation with the aid of a generalised linear model for panel data has shown that labour force, population of age 0 – 14, rural population, the average number of years spent in primary school has a positive relation with Child Labour while the age dependency ratio, school enrolment and government expenditure have a negative relation on child labour. As to what concerns our variable of interest, our estimation shows that on average, a 5% point increase in trade over a year leads to an increase in Child Labour by 10% point. There is therefore no empirical evidence that exposure to international trade, reduce the incidence of child labour for SSA countries. If anything, the evidence points the other way. The result of our estimation revealed that there seems to be no problem between FDI inflow and child labour. If the positive linkage between child labour and commercial openness for SSA countries is accepted, the inclusion of labour standard especially those concerning child labour, in the rules and mandate of the WTO is not appropriate this being because it may reduce commercial trade for SSA countries and hence the objective of encouraging trade by the WTO may not be attained. Such a result might suggest why the WTO keeps on rejecting this interesting proposal despite the incessant pressure mounted by the UE countries.

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APPENDIX 1

Table On the Regional Distribution of FDI Inflows and Outflows, 1992 - 2003

(Billion of US Dollar) **FDI in**flows								(Billion of US Dollar) FDI Outflow						
	1992 -1997							1992-1997						
Region/Country	(Annual average)	1998	1999	2000	2001	2002	2003	(Annual average)	1998	1999	2000	2001	2002	2003
Developed Countries	180.8	475.5	828.4	1108.0	571.5	489.9	366.6	275.7	631.5	1014.3	1038.9	658.1	547.6	569.6
Western Europe	100.8	263.0	500.0	697.4	368.8	380.2	310.2	161.7	436.5	763.9	859.4	447.0	364.5	350.3
European Union	95.8	249.9	479.4	671.4	357.4	374.0	295.2	146.9	415.4	724.3	806.2	429.2	351.2	337.0
Other Western Europe	5.0	13.1	20.7	26.0	11.4	6.2	15.1	14.8	21.2	39.6	53.3	17.9	13.3	13.3
Japan	1.2	3.3	12.7	8.3	6.2	9.2	6.3	20.2	24.2	22.7	31.6	38.3	32.3	28.8
United States	60.3	174.4	283.4	314.0	159.5	62.9	29.8	77.6	131.0	209.4	142.6	124.9	115.3	151.9
Developing economies	118.6	194.1	231.9	252.5	219.7	157.6	172.0	51.4	53.4	75.5	98.9	59.9	44.0	35.6
Africa	5.9	9.1	11.6	8.7	19.6	11.8	15.0	2.2	2.0	2.6	1.3	-2.5	0.1	1.3
Latin America and the Caribean	38.2	82.5	107.4	97.5	88.1	51.4	49.7	9.5	19.9	31.3	13.7	12.0	6.0	10.7
Asia and the Pacific	74.5	102.4	112.9	146.2	112.0	94.5	107.3	39.6	31.6	41.6	83.9	50.4	37.9	23.6
Asia	74.1	102.2	112.6	146.1	111.9	94.4	107.1	39.6	31.6	41.7	83.8	50.3	37.9	23.6
West Asia	2.9	7.1	1.0	1.5	6.1	3.6	4.1	0.5	-1.0	2.1	3.8	5.1	2.5	-0.7

Central Asia	1.6	3.0	2.5	1.9	3.5	4.5	6.1	-	0.2	0.4	-	0.1	0.8	0.8
South, East and South-East Asia	69.6	92.1	109.1	142.7	102.2	86.3	96.9	39.0	32.5	39.2	80.0	45.1	34.7	23.5
South Asia	2.5	3.5	3.0	3.1	4.0	4.5	6.1	0.1	0.1	0.1	0.5	1.4	1.2	0.9
The Pacific	0.4	0.2	0.3	0.1	0.1	0.1	0.2	0.1	-0.1	-	0.1	0.1	-	-
Central and Eastern Europe	11.5	24.3	26.5	27.5	26.4	31.2	21.0	1.2	2.3	2.5	4.0	3.5	4.9	7.0
World	310.9	690.9	1.086.8	1.388.0	817.6	678.8	559.6	328.2	687.2	1092.3	1186.8	721.5	596.5	612.2

Source: Sutana Thanyakhan (2008)

Appendix N° 2

Countries considered with available data for Sub- Saharan Africa.

Botswana, Burkina Faso, Burundi, Cape Verde, Cote d'Ivoire, Equatorial Guinea, Eritrea, Ghana, Kenya, Lesotho, Madagascar, Mali, Mauritania, Mauritius, Mozambique, Namibia, Niger, Rwanda, Sao Tome and Principe, Senegal, South Africa, Switzerland, Tanzania, Zambia and Zimbabwe.

Financing for Commercialization of Research Work and Implications for National and Regional Trade— Experiences from Eritrea

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Abstract

This paper explores issues related to commercialization of research work. The paper highlights that although improved research outcomes emerged in Eritrea over the last four years, fine-tuning research and innovation policies is needed to link it with industries to create research-based start-up businesses that would contribute to employment creation, economic growth and enhance competitiveness in national and regional markets. The paper reveals that commercialization efforts result in substantial benefits such as increased industrial growth in revenues, net income, and number of employees; better health and environment and improved quality of life by obtaining certain health and safety products, services, and processes; and more general economic growth leading to lower taxes and greater individual wealth overall. The paper further argues that commercialization could lead to an improvement in a country's competitive position regionally or globally. However, there should be a defined process and collaborative knowledge between research centers and industries to effectively enhance commercialization efforts.

Keywords: Research, Commercialization, Socio Economic Transformation, Eritrea

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1. Introduction

Commercialization of research is, in effect, the process of converting the output of research and development into products that can be exposed to consumer markets, aiming to increase their odds of capturing demand in those markets and thereby generating sales and revenue. The sales and distribution of these new innovative products ultimately generate economic benefits not only for the developers and marketers of the new products, but also the end user, and for

the overall economy (Nordicity and The Evidence Network, 2012). More specifically, Downie and Herder (2007: 25) define commercialization of research work as "the conversion of research results into products, services, and processes that can be the object of commercial transactions".

Transferring the knowledge and skills between universities and business and the wider community increases the economic and social returns from this investment. Academic knowledge is essentially a global public resource, and highly educated workers are the primary source of application of global academic knowledge to the domestic economy. This knowledge may be used to generate innovation, and that this innovation leads to productivity improvements in the economy. These productivity improvements translate directly into economic growth, and, hence, standards of living (O'Carroll*et al*., 2006).

Several studies suggest that when research and development expenditures increase, they create spillover effects in the localities in which they occur and local firm formation increases. These findings suggest that economic development strategies that focus on supporting research at the university level can be an important contributor to the economic growth of a region. For regions (such as Common Market for Eastern and Southern Arica) seeking to boost economic growth and development, support for local research efforts can play an important role.

This paper explores issues related to commercialization of publicly funded research and development in Eritrea. It focuses on public funding of research because in Eritrea nearly all of research funding is provided by the government (Eritrean Research Fund) in collaboration with its partners such as the African Development Bank and UNDP. Though improved research outcomes in the areas of business, agricultural, natural and social sciences emerged over the last four years, fine-tuning research and innovation policies is needed to link it with sectors and industries to create a sizable number of research-based start-up businesses that would contribute to employment creation, economic growth and thereby enhance competitiveness in national and regional markets such as Common Market for Eastern and Southern Arica (COMESA).

In Eritrea, financing research work for commercialization is almost non-existent. Although the Eritrean government has identified education and research as a key component for the country's growth, what is clearly missing is a set of policy instruments to incentivize the commercialization of research results. Efforts to create national innovation system, developing legal framework for intellectual property rights, providing public funds for venture capital, and targeting specific economic sectors and industries, while also increasing overall public participation in research expenditures are some of the critical issues that need to be addressed the soonest possible.

A focus of research has been so far research stemming from Eritrean Higher Education Institutions. Accordingly, a large number of research proposals have been publicly funded and many more are in the process of launching them. Nevertheless, most of researches conducted are interdisciplinary and not specifically linked to a particular company or start-ups other than being published on peer-reviewed academic journals. Research departments in higher education institutions are not better endowed for research; not getting research budgets; lacking clear guideline and policies of research. Generally, the research institutes are not affiliated with spinoffs.

Thus, the central research question of this study is: "*how effective is the current level of research to innovation and socioeconomic transformation thereby its contributions to trade both at national and regional level*."

2. Empirical Literature

Generally universities and research institutions facilitate the creation and commercialization of research products or commercialization of intellectual property (Siegal and Wright, 2007). The topic for research commercialization becomes a critical issue, and it is especially relevant for the university-based technology (Rothaermel *et al*., 2007). Thus, policy maker has perceived universities and research institutions as an engine for economic growth through commercialization tools (Markman *et al*., 2008). Furthermore, how well companies manage to create value from technology commercialization depends very much on what happens before the product is developed (Hamzah, 2011). There are various functions of research product commercialization including for example that products should be based on industrial needs and relevant to private sector (seePowers and McDougall, 2005;Agrawal and Henderson, 2002; Nicolaou and Birley, 2003), to boost economic activities (Dietz and Boseman, 2005) and to create new jobs (Di Gregorio and Shane, 2003; Perez and Sanchez, 2003).

Enormous evidence shows the relationship between research and development and productivity growth, one of the most complex yet vital issues in today's business world (see for example, Jaffe and Trajtenberg, 1996; Mohnen, 1996; Blomström and Kokko, 1998; Cincera and van Pottelsberghe, 2001). Academic research and development is now seen as one of the key drivers of economic growth. If COMESA countries create academic institutions performing large amounts of research they will be more able to attract and grow technology orientated companies that will successfully compete in the global market. Academic research and development is an integral part of the innovation economy, with contributions in the form of patents, new commercial products, skilled employees, new companies, job creation, and tax revenues.

Research within universities also has the potential to produce breakthrough advances that can fundamentally alter country's economic growth and quality of life through productivity impacts either at the regional level or at the national level, which establishes the contribution of university research and development to GDP. Although not all research leads to such world-changing results, it does produce a steady stream of new ideas and technologies. These, in turn, lead to innovation and continuous improvements in productivity. Research and development is widely recognized to be one of the most important factors in the innovation process. Lichtenberg and Siegel (1991) have shown a direct link between investment in research and development and future improvements in productivity.

Berman (1990) examined the economic impact of industry-funded university research and development and found that university-funded research increased the industry research and development expenditures. The funded research resulted in technological innovation in industry. Thus, it seems plausible to argue that financing for commercialization of research work will result greatly in socio-economic transformation even across COMESA member countries.

Moreover, the literature on university/research institution-based technology transfer is clear to point out that the success of a research institution's licensing and spinoff program depends on its institutional structure, organizational capability, and incentive systems to encourage participation by researchers (Phan and Siegel, 2006). The incentives systems include both pecuniary and non-pecuniary rewards, such as credit towards tenure and promotion.

3. Analytical Framework and Methodology

The framework to analyze the factors affecting commercialization of research work and its impact on socio-economic transformation is based on a number of factors. First, the state of the research base of Eritrea including the governance of research institutions and the role of performance based budgeting is paramount toassess the critical mass that may generate discoveries; incentivize commercialization efforts and increase the quality of research (Gianella and Tompson, 2007; OECD, 2003). Second, the availability of human capital (specifically in Higher Education Institutions)for research and the resources at their disposal, as well as incentives for career development are key for increasing the likelihood to successfully bring research to the marketplace (Aldrigde and Audretsch, 2011). Third, the analysis framework relates to the vast literature on market failures for funding of ideas, especially in the early stage of the commercialization process (for example, Branscomb and Auerswald, 2003). Finally, the intellectual property rights legislation is the frame that could incentivize commercialization by regulating the ownership and royalty distribution of publicly funded research (Phan and Siegel, 2006).

The analytical framework of this study is given in Figure 1. The analytical framework used here is an embedded approach. In the model (analytical framework), we suggest that the purpose (financing for commercialization of research work and national and regional economic development) and availability of knowledgeable and skilled human resources and research grants (financing/funding) influence business, research, science, and technology relationships. These outputs in turn result in increased enterprise performance, employment, and investment. Finally, the ultimate purpose is socioeconomic benefits (sustainable regional growth, economic development and social wellness, and improved environment and health care). Of course, it is worth noting that socioeconomic transformation is more complex than the sum of research outputs.

The model is not simply a checklist of procedures that should be followed. It merely aims to spell out what we would expect to see changes in society (socioeconomic transformation) if governments and other stakeholders invest in financing research for commercialization purposes. It is not suggested here that these are the things governments or research institutes should necessarily be doing. Now we turn on to an exploration of each level in our analytical framework to give a theoretical basis.

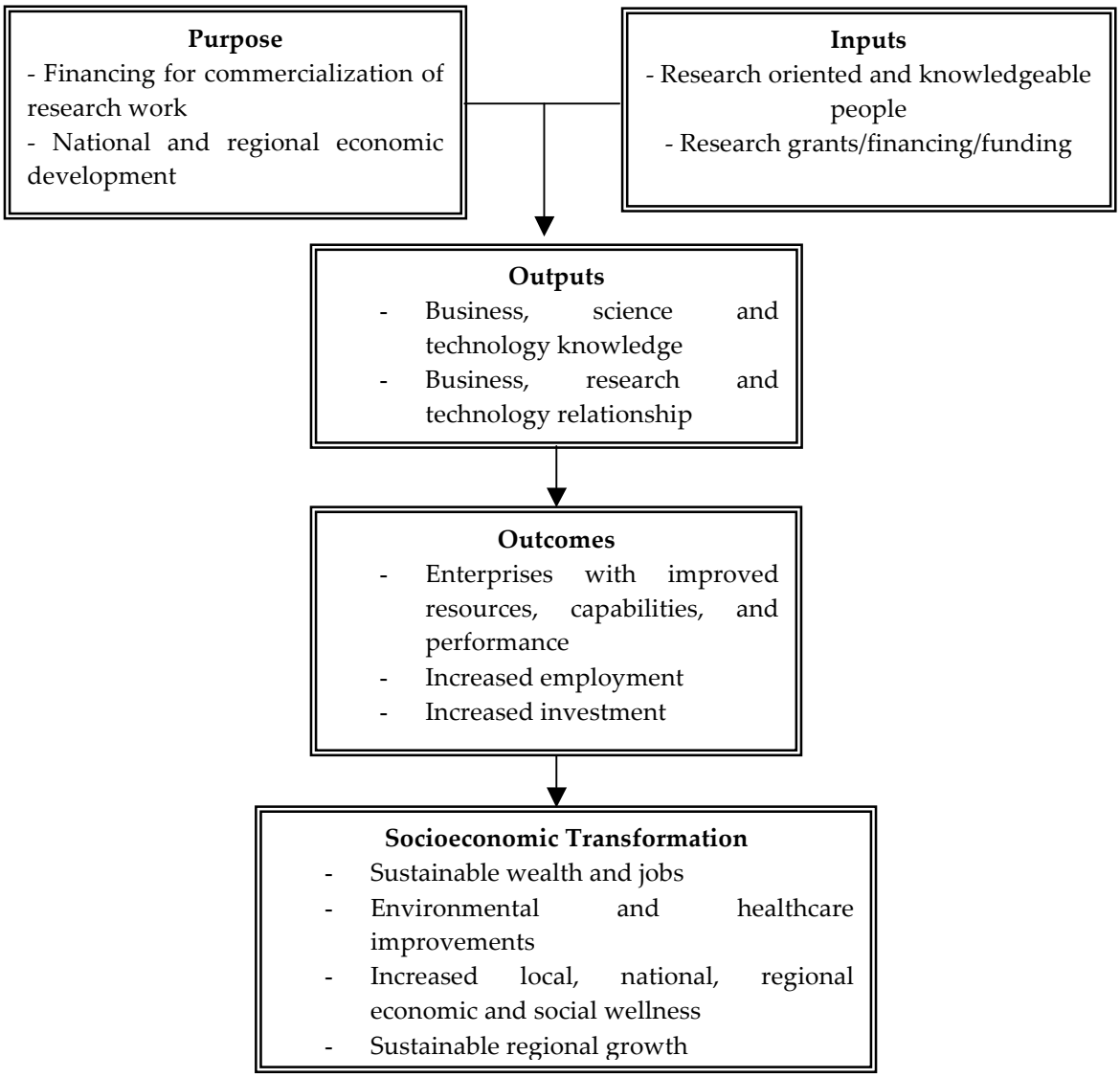

Figure 1: An Analytical Framework for Commercialization of Research Work and Socio-economic Transformation
Source: based on literature review

The above framework shows logical flow; that is, how different types of impacts are achieved. Working bottom to top, the achievement of socioeconomic transformation (social benefits such as sustainable wealth and jobs, better health care and environment, economic and social wellness, and regional growth) depends on outputs and outcomes. For example, an innovation intermediary that seeks to create economic growth in a region does so by facilitating commercialization of research through improvements in the performance of local companies, either by facilitating company growth and the creation of new ventures or by facilitating improvements in the resources and capabilities of local companies.

To achieve the above stated specific purposes, it is suggested here that inputs such as human and financial capital, to effect changes in companies through activities that include financial offerings such as funding for commercialization support, as well as non-financial offerings such as mentoring, linkages to business services, and facilitation of funding. Through these offerings, companies benefit on their resources and capabilities. For example, companies gain access to

information and advice, and business and research linkages; enabling for example, improved business models or strategies, linkages to suppliers or channel partners, or access to technical services provided by other organizations. These are achieved through financing of research work for commercialization.

With improved resources and capabilities, the logic is that companies will achieve superior market performance, for example, increased market share, revenues, or investment and exporting them to regional markets at an affordable price or create a network of channel partners in the region. It then follows that companies with improved market performance will create impact on the economy that would not otherwise readily occur, helping to realize the ultimate policy impact: improved socio-economic conditions in Eritrea and beyond in the COMESA regional market.

In conducting this study, we mainly used operational data and we interviewed the concerned peoplefrom the office of the Directorate of Research and International Linkages of Higher Education of Eritrea. We also consulted some of the Research and Graduate Study Offices of Higher Education Institutes. Several face-to-face interviews have also been conducted with concerned respondents who are actively engaged in research work. The interviews were conducted using semi-structured interview questions for in-depth understanding of the elements for a research products commercialization. The structure of the interview questions were designed specifically to capture the respondents' real experience, opinions and expectations (Patton, 2002) related to successful research products commercialization.In this regard, we interviewed 6 researchershereafter named as Researcher 1, 2, 3, 4, 5, and 6 for anonymity reasons. Generally, a qualitative research method has been adopted.

Secondary data has been extracted from several relevant academic articles, documents, as well as other references that we used as a benchmark for making economic and social impact analysis of commercialization of research work.

Due to the gap in the current literature related to financing of research for commercialization purposes, case study was employed in this study.

4. Findings and Discussions

This study has developed a general framework for a sustainable socioeconomic transformation through financing of research work commercialization.Socio-economic transformation as commonly defined is a process in which an increasing proportion of economic output and employment are generated by sectors other than agriculture. This process of transformation connotes the shift from agricultural-based societies to urban, industrial and/or service-based economies with sustained high GDP growth rates. GDP growth combined with a reduction in the population's growth rate—resulting from improvements in educational access and quality—increases GDP per capita, which, in turn, reduces poverty (Mpango, 2013).

The above definition explains that socio-economic transformation entails fundamental changes in both the way a country does business and in the character of the country itself, that is, in the qualities and characteristics that make a country different.

Having a highly educated population has enormous economic and societal impacts (higher wages, higher levels of civic participation, and better health status). Since education is now a global industry, COMESA member countries have the opportunity to create an extensive knowledge base and become highly competitive players in the knowledge society/economy. For example, survey results show a unique conception of the role of the university in the knowledge based economy not just as a creator of knowledge, a trainer of young minds and a transmitter of culture, but also as a major agent of economic growth: the knowledge factory, as

it were, at the centre of the knowledge economy (David, 1997).The commonly held perception of universities as merely institutions of higher learning is gradually giving way to the view that universities are important engines of economic growth and development (Chrisman *et al*., 1995).

In Eritrea, public fund for research is granted only to Institutes of Higher Education through Eritrean Research Fund (ERF). Nevertheless, this is excluding researches and consultancies directly funded by respective ministries, other government agencies, and non-governmental organizations in collaboration with their partners. Each higher education institute and its stakeholders are expected to conduct research scoping workshops to identify areas of research priorities. Then fund is given to research proposals based on importance at the national level and scientific product.

Over the last five years, the Government of the State of Eritrea sponsored several research projects. The government allocated roughly 6.5 million Eritrean Nakfa (equivalent to 433, 500 US dollar) for research. Researchers from various government colleges submitted their research projects for funding. According to Head of Research Unit of National Higher Education and Research Institute, a total of 120 research projects have been submitted of which 41 proposals funded (31 of them are already completed); the review process for 40 proposals is currently completed, and the remaining 39 proposals are not accepted. The research projects focus on business, agriculture, marine science and technology, engineering and other natural sciences.

Regarding the outcomes of the research and its impact on social and economic conditions, Researcher 1, who studied handcraft products development, stated that: "*handcraft production as an industry has to be perceived as a potential business opportunity for sustainable income generation that involves more artisans, traders and exporters. Eritrea, with its abundant archeological/historic and cultural attraction and natural endowments such as over 1,000 k. m. coastlines and its geographical proximity to major tourist markets in Europe and the Middle East has a large potential to become tourists' hub in the region. If meticulously planned, effectively organized and skillfully managed, tourism related products can contribute to the economic development in Eritrea*."

There are other researchers who in their area of expertise and experience conducted various researches. However, the concern is that nearly all of them lack entrepreneurial, managerial and marketing skills. For instance, Researcher 2 who studied Salt as the would pillar of Eritrean industrystated that: "*my research output can be very ideal for companies that depend on salt as the pillar of their operations. Salt is as important as gold.It is very useful in chloroalkaline industry and companies can generate millions of dollars because their products can be exported to other countries in general and Asian countries such as Japan, in particular. The problem is commercializing research work. I am trained as a chemist and I should know about how to be an entrepreneur*."

Thus, it is evident that research is not linked to businesses. If socioeconomic transformation is to be realized due attention should be given to commercializing research work and protecting intellectual property rights. On the importance of linking research to businesses and producing highly demanded and competitive products nationally, regionally, and globally Researcher 3 highlighted that: "*the marketing/management and engineering people should work closely. The first are well versed in researching about the products that customers want, but lack the skill to design them; and the later have the ability to design the product but they lack the knowledge of identifying, producing, and promoting the product (marketing ideas)*."

On similar instance, a Director of Research and Graduate Studies (Researcher 4) in one of the Institutions of Higher Education underlines that: "*you know follow-up and implementation is very important if the output of research work is to bear fruit. Here we have a research work on entrepreneurship and innovation. This research calls for the establishment of entrepreneurship center under the umbrella of the Chamber of Commerce. In addition, there is also the issue of intellectual*

property rights, which may be dealt with the Chamber of Commerce or Ministry of Justice. Unless an office is established which is specifically tasked with follow-up and implementation, commercialization of research work may have very little impact on socioeconomic transformation."

In addition, Researcher 5 reflecting the view on the importance of research works on environmental improvement based on his research stated that: "*coral reef monitoring is highly essential because if the reef is destroyed there will be a decrease in stock and a decline in fish reproduction and consequently a decrease or no fish export at all. The research work indicates that by monitoring the reef, ecology and environment will be improved resulting in substantial tourist attraction thereby contributing to economic growth and better health and improved standard living of the people*."

Finally, Researcher 6 said that "*to come up with viable research for commercialization, researchers should be discipline and motivated. A platform should also be created where ideas can be generated and shared to facilitate commercialization efforts*."

Financing research work for commercialization is of paramount importance especially if that work results in innovation. Indeed, manufacturing can create employment opportunity. However, for African countries in general, it is time to echo innovation, innovation, and innovation. Of course, there should be enough resources devoted to innovation activities in both public and private sector.

Much more could have been done to link commercialization of research work with spinoffs and new product development. However, the institutional structure of the Eritrean research system is highly hierarchical and centralized which makes it inefficient in bringing research results into the marketplace. As most of the funding for research institutions is still allocated in a headcount basis, the incentives to increase performance in terms of research productivity are not in place. Moreover, the budgetary organization status of research institutions of higher education is not conducive for engaging in joint research and development with private firms, as it is difficult to formalize those partnerships.

5. Conclusions and Recommendations

Publicly funded research provides research results for the public domain, and this can be adopted by the business sector so that research results from public institutions can be translated into new production processes and products. In this regard, COMESA member countries (proximity or nearness is an advantage) can offer regional companies new markets, more value-added and innovative activities.

Research that results in the development of new technologies (processes) coupled with information and communications technologies can change regional business practices, as well as emphasizes international collaboration to go beyond regional partnerships. However, governments in member countries need to prioritize industrial reconstruction and job creation as well as identify opportunities for knowledge-based advantages.

For COMESA countries, rising standards of living can only come through productivity growth reinforced by innovation, which by and large innovation itself is the result of investment in research and development. This; of course, is without ignoring the importance of financing research work for commercialization purposes. If they are unable to assemble the financing, management and sales skills needed to quickly commercialize and exploit regional markets, companies in other countries or continents will surpass them, which may result in the loss of economic benefits.

Financing research work for commercialization can result in substantial industrial and social benefits. Through increased public fund support for commercializable research in public

institutions, industry may realize increased growth in revenues, net income, and number of employees. This could in turn benefit the companies' employees, shareholders, and other stakeholders. The requirements for partnering with industry may increase the number of academics willing to work with industry, which may ultimately lead to more and better research results and, through these results increased industry profits. Finally, the public reputation of industry may be enhanced by its partnership with public institutions and contribution to economic growth.

Commercialization of research may also result in better health and environment and improved quality of life of the population. Society can reap several benefits by obtaining certain health and safety products, services, and processes that, without commercialization, would never have been developed or may never appear in the market. Thus, it seems plausible at this juncture to conclude that an increase in commercialization could push researchers in public institutions to become increasingly involved with industry.

Furthermore, the commercialization of research may have a number of economic implications. Not only will individuals, public institutions, and companies directly involved in research profit from commercialization, but consumers may enjoy lower prices resulting from greater competition in the market place. Besides, more general economic growth can be achieved leading to lower taxes and greater individual wealth overall. In addition, research-led improvements in technology may increase productivity, in turn boosting the general standard of living and per capita income.

The commercialization of research may result in an increased number of preferable and higher quality jobs for skilled workers. Similarly, commercialization could lead to an improvement in a country's competitive position regionally or globally.

To sum up, if publicly funded research is linked with demand-driven research from start-ups and other established businesses,and focuses on innovation, why not a Silicon Valley in COMESA countries.

However, there should be a defined process and collaborative knowledge between universities and industries to effectively enhance commercialization efforts. Hence, attempts must be made to ensure that a proper framework exist to ascertain the smooth interaction and communication between these two entities if research institutes are to play their role of local economic growth. If commercialization effort is to be sustainable, there should be a well functioning research center with clear research policies and strategies.

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Emotional Intelligence in Professionals and Students in Chile

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Abstract

To achieve success in the labour market is necessary not only to have high intelligence quotient but also to develop emotional abilities. Recently, the term "emotional intelligence" has been created to indicate the abilities that help control the emotions and put them at the service of work performance. The scope of this investigation was an exploratory study type that included the evaluation of the emotional intelligence (EI) in targeted (not probabilistic) and significative (probabilistic) samples of civil engineering students of Universidad de La Serena and SAG and INDAP staff, The instrument of self-report was applied through an online questionnaire, with the purpose of respecting the privacy of the participants and avoid any type of influence in their answer. An important aspect of this investigation is to determine if there are any differences in the levels of emotional intelligence among people that are already working in their areas and people that are still studying at university, there are differences between the intelligence and emotional measures among people that work and the students, who had the lowest scores. this study provides evidence about the internal consistence of WLEIS, confirming the original model proposed by Wong and Law.

Keywords: Emotional Intelligence, Emotions, Engineering.

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1. INTRODUCTION

The labour market has changed and it is not possible to talk about an unique profession or about a job in the same company for a whole lifetime. According to Dubrin (2008), to achieve success in the labour market is is necessary not only to have high intelligence quotient but also to develop emotional abilities. Recently, the term "emotional intelligence" (EI) has been created

to indicate the abilities that help control the emotions and put them at the service of work performance (Espíndola, 2005).

According to Madrigal (2009) for managers, the leader and the administrator of the emotional intelligence has a significant influence over the critical factors that are developed in the organization, such as the decision-making, leadership, communication, the trust relationships between staff, teamwork, loyalty, creativity and innovation. This is particularly true in the case of professionals that have been and will be formed with a wide dosis of hard and quantitative sciences, which most rely on mathematical models for decision-making or solution for problems.

The emotional intelligence has been related to the personal and professional performance of a person, in such a way that Anand and UdayaSuritan (2010) mention that it empowers the managers with the ability of intuiting what the others need and want and develop strategies to fulfill such needs and desires. Additionally, Wong and Law (2008) mention that the emotional intelligence has been proposed as an important and potential construct for the management of human resources; they also mention that in the recent years the relationship between the emotional intelligence and the performance has been more obvious in the studies in China.

This relationship between emotional intelligence and the professional performance identified previously and studied by many authors, has not yet been studied fully in Latin America (Zárate and Matviuk, 2010), and that is the reason why it was decided to conduct an exploratory investigation that seeks to validate the instrument developed by Wong and Law (2002) in the work environment of Chilean reality of the Region of Coquimbo. Finally, it was decided to measure the levels of emotional intelligence in subjects that work in the government sector of the region of Coquimbo (SAG and INDAP) and in subjects that are been formed to be part of the labour market (students of Civil and Industrial Engineering of the Universidad de La Serena), for later comparison.

2. EMOTIONAL INTELLIGENCE

Salovey and Mayer (1990, page 189) state that the emotional intelligence derives from social intelligence and define it as "the ability to monitor one´s and others feelings and emotions, distinguish, classify and use them to guide our thoughts and actions".

EI has been conceptualized in two models: the model of mixed features and the model of capacity (Goldenberg et al.,2006). The model of mixed features incorporate a bread rage of characteristics of personality and other features to describe the EI (Bar-On, 2001; Goleman, 1995, 1998; Petrifies and Furnham,2011). This trend is mainly criticized for no incorporating any conceptualization of emotion and for incorporating multiple aspects of the personality (for example: optimism, motivation and capacity to get involved in relationships) without establishing a relation with emotion and intelligence (Goldenberg et al.,2006).

In the model of ability, the most influential authors are Salovey and Mayer (1990, page 189) that describe the EI as "a subset of the social intelligence that implies the ability to monitor one´s feelings and emotions and of others, discriminate between them and use this information to guide thoughts and actions". To sum up, this framework allows to identify the specific abilities needed to understand and experience the emotions in a more adaptive way (Salovey and Mayer, 1990). In this level, EI is described in three domains: 1) the precise evaluation and expression of the emotion (in oneself and in others); 2) the adaptive regulation of the emotion (in oneself

and in others) and 3) the use of the emotions to plan and motivate the action (Salovey *et al.*, 1993). Although there is a broad acceptance of Salovey and Mayer´s framework (Goldenberg *et al.*, 2006), there is no consensus about how it can be evaluated (Conte, 2005, Davies *et al.*, 1998). In fact, the measures based on the model of performance and the measures based on the model of self-reports have a significant difference (Goldenberg *et al.*, 2006). The first one considers that EI should be evaluated through the resolution of problems to evaluate if the answer is correct, that is to say, indicative of a high EI. The second considers that EI must be measured by asking people about their own level of EI. In the approach of the model based on the capacity, two were the measurement instruments that had the greatest impact, which corresponds to: Multi-faceted Emotional Intelligence Scale (MEIS) (Mayer *et al.*, 1997) and Mayer-Salovey-Caruso emotional intelligence test (MSCEIT) (Mayer *et al.*, 1999). MEIS includes more than 402 items and takes between one and two hours to complement them (Wong & Law, 2002) and has two different methods to identify the correct answers (as to say, the target score, consensus score and experts score). As this scale presented low reliability and some problems with the score procedures, the authors developed MSCEIT (Conte, 2005). MSCEIT has 141 elements and takes from 30 to 45 minutes to complement itself. Nevertheless, as in the case of MEIS, there is a group of critics agains this measure, because of the following inconveniences that it presented: there is no consensus among experts about the evaluation of the answer, the length of time to administrate the test and the high costs of its application (Conte, 2005; Goldenberg *et al.*, 2006).

Among the self-reported measures, we can distinguish the self reported emotional intelligence scale, (Schutte *et al.*, 1998) and the Wong & Law Emotional Intelligence Scale, (Wong & Law,2002). SREIS (Schutte *et al.*, 1998) has 33 items and it is represented in a solution of one factor. WLEIS (Wong & Law, 2002) has sixteen items with a solution of four factors distributed in four dimensions: self-esteem appraisal (SEA): capacity to understand deep emotions and express them in a natural way; Other´s emotional appraisal (OEA): capacity to sense and understand other´s emotions; Regulation of Emotion (ROE): capacity to self-regulate the emotions; Use of Emotions (UOE): individuals capacity to make use of emotions directing them to the constructive activities and personal performance.

In comparison with the EI measures based on the abilities model, the measures of self-reports model have received more psychometric support and are easier to administrate. In addition, it is important to consider that WLEIS is shorter and has a structure of four factors that seem to be more reliable to represent Salovey and Mayer´s EI framework (1990). Thus, the propose of this research was to evaluate the psychometric properties of WLEIS in Chilean reality (in an exploratory mode).

WLEIS has already presented proper psychometric evident in previous studies. Just as BotmiS and Ergeneli (2014) investigated the construct validity of WLEIS with a group of nurses in Turkish and confirmed the validity of the scale, Libbrecht *et al.* (2014) concluded that WLEIS is an invariant through a sample of populations in Singapur and Belgium. In addition, Shi and Wang (2007) validated the use of WLEIS in Chinese university students and Rodrigues *et al.*, (2011) in the Portuguese reality. Due to these investigations, it is believed that it could be also suitable for Chilean reality. This investigation, therefore, proposes to analyze the psychometric properties of WLEIS in Spanish, that is spoken wildly in different countries in the world. It is important to mention that previous investigations in Spain demonstrated that WLEIS is reliable for the con-

text of Spanish speaking (Fernández-Berrocal *et al.*, 2004). Therefore, these studies were considered in the procedure of translation.

To validate this instrument in Chilean society, the multivariate technique called structural equation model has been used and has two stages. In the first stage it was conducted a confirmatory factor analysis to evaluate the appropriateness of the measurement model, analyzing the reliability of the items and the proposed constructs. Once confirmed the reliability of the scale used, the constructs were confirmed through the analysis of their convergent and discriminant validity. In the second stage, it was evaluated the structural model, analyzing the general adjustment through the use of goodness of fit such as Chi-Square, CFI, RMR and RMSEA (Hair *et al.*, 1998; Jöreskog y Sörbom, 1993; Schumacker and Lomax, 2004).

3. METHOD

Taking in consideration the topic to be studied, it has been determined that this investigation was exploratory and according to Hernández *et al* (2010), the exploratory studies are carried out when the objective is to review a topic or problem of research with little study, which has several doubts or has not been addressed before. In addition, according to Zárate and Matviuk (2010), this relation between emotional intelligence and professional development studied by many other authors, has not been studied deeply in Latin America.

The format of this work was non-experimental exploratory transectional. A no experimental design was used, since this type of design seeks to observe phenomena's that appear in the natural context, for later analysis (Hernández *et al*, 2010). In addition, this design was of transectional or transversal type, which purpose is to describe variables and analyze their incidence and interrelationships at a precise moment. And finally, it was an exploratory transversal type because it seeks to start to know a variable or a group of them at a given time.

3.1.- Participants

The main role of SAG (Agricultural Inspection Service) and INDAP (Institute of Agricultural Development) is related to the development of the national agricultural sector, that is why it is so important to know the organizational behavior of their workers (in the Region of Coquimbo, Chile) from an emotional perspective in order to reach institutional objectives. In addition, it was decided to evaluate the students of Civil Engineering of Universidad de La Serena as they will be in the near future the professionals working in the labor field. As has been proved with different studies, the emotional intelligence affects the physical and mental health of the people, as well as their professional achievements (Goleman, 1995).

The scope of this investigation was an exploratory study type that included the evaluation of the emotional intelligence (EI) in targeted (not probabilistic) and significative (probabilistic) samples of civil engineering students of Universidad de La Serena and SAG and INDAP staff. For the study, we counted with the participation of 261 individuals, of which 157 corresponded to people that work in Governmental Institutions (55% male and 45% female) and 104 students (52% male and 48% female). The number of participants is satisfying, because, according to Kline (2005), an adequate sample number should have between 10 and 20 individuals per parameter (for the case of this study it corresponds to 16 variables). On the other hand, Jackson (2003) suggests that the reliability of the observed measures and the number of indicators per

factor determine the adjustment of the model and controlling this factor the size of the minimum recommended sample is of 200 subjects for any SEM (Structural Equation Modeling).

The Emotional Intelligence Scale has 16 sentences that are evaluated in Likert Scale with a score value from 1 to 5 (1 = fully disagree and 5 = fully agree), that determine each of the abilities of the emotional intelligence. The instrument of self-report was applied through an online questionnaire, with the purpose of respecting the privacy of the participants and avoid any type of influence in their answer.

3.2.- Statistical Analysis

The process of analyzing the instrument consists of determining its validity. The validity has been defined as the degree to which a test measures what is designed to measure, and in the case of this research, it refers to the degree of relationship that exist between each of the variables (statements that are valued using Likert scale) with their respective factor (Aiken,2003).

4. RESULTS

4.1 Exploratory Factor Analysis (EFA)

The criteria used to carry out this analysis correspond to KMO test, the analysis of the Commonalities, the percentage of the variance explained and finally the interpretation of the rotated matrix data. It is important to highlight that to carry out the exploratory factor analysis in Spssv23 software, the main compounds were used as a method of extracting factors. According to Lloret-Segura (2014), the use of these methods have shown good results in the factoring of ordinary items, when using polychoric correlation matrix. In addition, Varimax criterion was used to rotate the matrix of factorial loads, this because the factorial loads presents a simple structure when each variable has a large load in a single factor, with leads near to zero in the other factors. One of the orthogonal rotations (the new axes after a rotation are still orthogonal) that seek to generate a simple loads structure is the Varimax rotation.

Table 1: KMO and Bartlett test

Kaiser-Meyer-Olkin measurement of sampling adequacy		0,813
Bartlett's Test of Sphericity	Chi-squared approximate	1218,373
	gl	120
	Sig.	0

Source: Own Elaboration.

Table 2: Commonalities in the instrument variables

	Inicial	Extraction
EP1	1	0,515
EP2	1	0,732
EP3	1	0,753
EP4	1	0,59
EO1	1	0,576
EO2	1	0,681
EO3	1	0,499
EO4	1	0,799
UE1	1	0,651
UE2	1	0,634
UE3	1	0,771
UE4	1	0,723
RE1	1	0,742
RE2	1	0,743
RE3	1	0,656
RE4	1	0,786

Extraction method: analysis of main compounds
Source: Own Elaboration.

As observed in table 1, the value of KMO measurement is superior to 0.6, and the value of significance of the sphericity of Barlett is lower to 0.5, therefore, it is correct to apply a factor analysis. The commonalities represent the proportion of the variance of the indicated variable that is explained by the model common factors. Hair (1999) proposed that the variables with a lower commonality of 0.5 lack of a sufficient explanation and should not be considered in the final interpretation of the analysis. As can be observed in table 2, all the variables obtained a value greater than 0.5, therefore, no instrument variable are discarded.

The criterion of the percentage of variance explained seeks to ensure that the number of extracted factors reach a determine percentage of the total variance of the data. Although it has not been determined a precise percentage of explained variance that works as a threshold to conclude the extraction of the factors, some authors suggest that in the case of applications related to Social Sciences it is possible to stop the process when it reaches 60% of variance (Hair, 1999).

As observed in the table 3, the fours factors used explained a 67% of the variance of the model, which meets the criteria of exploratory factor analysis (Ford *et al.*, 1986; Kim and Mueller, 1978; Stevens, 1992).

Table 3: Total variance explained

Factor	Inicial EI value			Sums of extraction of squared loads			Sums of rotation of squared loads		
	Total	% of variance	% acumulated	Total	% of variance	% acumulated	Total	% of variance	% acumulated
1	5,693	35,583	35,583	5,693	35,583	35,583	2,949	18,429	18,429
2	2,184	13,647	49,23	2,184	13,647	49,23	2,837	17,731	36,16
3	1,719	10,746	59,976	1,719	10,746	59,976	2,615	16,342	52,502
4	1,254	7,839	67,815	1,254	7,839	67,815	2,45	15,313	67,815
5	0,827	5,169	72,983						
6	0,608	3,801	76,784						
7	0,581	3,633	80,417						
8	0,502	3,139	83,556						
9	0,452	2,827	86,383						
10	0,44	2,749	89,132						
11	0,38	2,373	91,504						
12	0,357	2,234	93,738						
13	0,313	1,957	95,695						
14	0,29	1,813	97,508						
15	0,223	1,397	98,905						
16	0,175	1,095	100						

Extraction method: analysis of main compounds

Source: Own Elaboration.

The last criteria that is analyzed in the exploratory factor analysis is the interpretation of the matrix of rotated compounds. The main reason to rotate a solution is to clarify the structure of the factorial loads. The factors must have a clear meaning for the investigator from the context of application. If the structure that shows the factorial loads is confusing or hard to interpret, a rotation can provide an easier structure to interpret. As can be observed in table 4, with this procedure the analysis is clearer in respect to the numbers of factors and the variables associated to it, and in the case of this analysis the number of factors (abilities) and its respective variables agree with the ones of the instrument.

Table 4: Matrix of rotated compounds

	Compound			
	1	2	3	4
RE1	0,845	0,01	0,04	0,16
RE2	0,845	0,1	0,07	0,12
RE4	0,805	0,31	0,13	0,17
RE3	0,785	0,16	0,07	0,11
UE3	0,163	0,83	0,05	0,21
UE2	0,066	0,78	0,04	0,12
UE4	0,192	0,78	0,18	0,21
UE1	0,116	0,75	0,24	0,13
EO4	0,14	0,02	0,86	0,18
EO2	0,028	0,11	0,8	0,15
EO3	0,137	0,09	0,69	0,06
EO1	-0,03	0,25	0,67	0,25
EP3	0,163	0,15	0,1	0,83
EP2	0,2	0,15	0,19	0,8
EP4	0,26	0,27	0,11	0,66
EP1	-0,01	0,14	0,35	0,61

Extraction method: analysis of main compounds.
Rotation Method: Varimax with Kaiser normalization[a]
[a]The rotation has converged in 5 interations
Source: Own Elaboration.

4.2 Confirmatory factor analysis

The factor analysis assumes that in a determined context there is a reduced number of variables or latent construct, that is to say, no observable, that influence in the large set of observable variables. The purpose of the confirmatory factor analysis is to test statistically the capacity of factorial model proposed to reduce the data compiled in the sample. The researcher have to specify a determined number of latent variables correlated, as well as a series of observable variables to measure the latent variables (Hair et al.,1998). Because of that, we work with the following hypothesis:

H_1: The emotional intelligence has four different abilities (dimensions), that include: the valorization of one´s emotions, the regulation of one´s emotions, the use of emotions and the valorization of other´s emotions.

The results obtained using the program called amosv23 are presented in table 5.

Table 5: Contrast of verisimilitude

Computation of degrees of freedom (Default model)	
Number of distinct sample moments	136
Number of distinct parameters to be estimated	36
Degrees of freedom (136-36)	100
Result (Default model)	
Chi-square	248,355
Probability level	0,000

Source: Own Elaboration.

The first global diagnosis of the model is the «contrast of verisimilitude ratio or statistic X^2» or p value, that for the case of this study is lower to 0.5 (table 5), therefore, the null hypothesis (which established that the restrictions of the model were correct) is rejected. Given that the model cannot be more than an approximation of the reality, the hypothesis that establishes that the model is exactly correct will always be fake and its contrast even absurd. In practice, it will be more interesting to measure the degree of adjustment (or mismatch) of the model than simply rejecting or accepting the null hypothesis.

Table 6: Adjustment of CFI model

Model	NFI Delta1	RFI rho1	IFI Delta2	TLI rho2	CFI
Default model	0,879	0,86	0,924	0,91	0,92
Saturated model	1		1		1
Independence model	0	0	0	0	0

Source: Own Elaboration

Table 7: Adjustment of RMSEA model

Model	RMSEA	LO 90	HI 90	PCLOSE
Default model	0,076	0,064	0,09	0
Independence model	0,249	0,239	0,26	0

Source: Own Elaboration

Table 8: Adjustment of RMR model

Model	RMR	GFI	AGFI	PGFI
Default model	0,042	0,891	0,852	0,655
Saturated model	0	1		
Independence model	0,214	0,361	0,276	0,319

Source: Own Elaboration

Table 9: Adjustment of x2/gl model

Model	*NPAR*	*CMIN*	*DF*	*P*	*CMIN/DF*
Default model	36	248,355	100	0	2,484
Saturated model	136	0	0		
Independence model	16	2049,09	120	0	17,076

Source: Own Elaboration

After observing the values of the tables 6, 7, 8 y 9, it can be determined that the values obtained adjust with the acceptable form of the local reality. This is how values such as CFI are higher than 0.9 (Bentler, 1990), RMR lower than 0.005 (Byrne, 1998) and RMSEA lower than 0.1 (MacCallum *et al.*, 1996).

In addition, the results show a similitude with the results from other authors that have carry out studies of CFA validating this instrument. In the case of the confirmatory factor analysis carried out by Wang and Law (2002), the results were X^2 / df = 1.82, CFI = 0.91 and RMR = 0.07, in the study carried out by BitmiŞ and Ergeneli (2014) the results were X^2 / df = 2.17, CFI = 0.93 and RMR = 0.04, the research carried out by Kong (2017) in the Chinese reality the results were CFI = 0.96, RMSEA = 0.050, SRMR = 0.032 and Iliceto and Fino (2017), whom validated the instrument in the Italian reality (CFI = 0.981, RMSEA = 0.046, SRMR = 0.036).

The figure 1 shows the result of the modeling through amos v23 of the emotional intelligence scale.

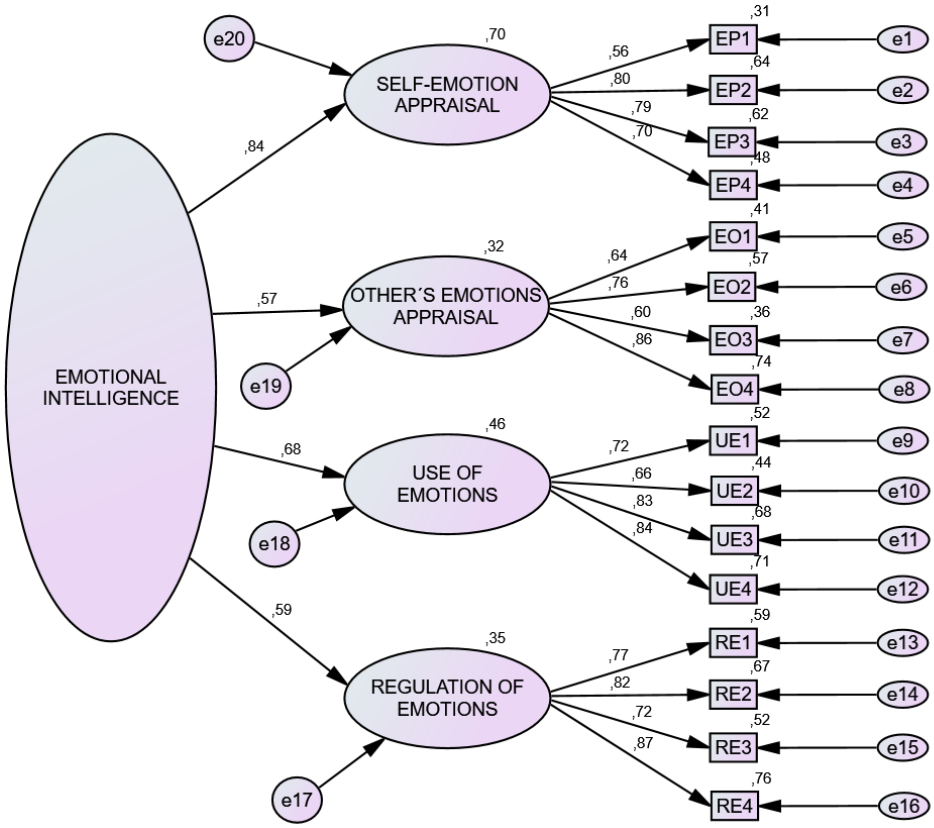

Figure 1: Model emotional intelligence scale
Source: Own Elaboration

Each arrow in the model represents a "path" coefficient that indicated the magnitude and the mark of the effect of a variable over another endogenous variable. The standardized "path" coefficients are coefficients of partial regression that represent the effect of a variable over another, controlling the rest of the variables. Some authors point that the standardized loads for each item of the scale used must be superior to 0.7, even though a value higher than 0.5 is also acceptable (Fornell y Larcker, 1981, Hair *et al*., 1998). The values that the variables are observed correspond to the value of the variance explained in the variable by the construct (R^2), that can

be understood as the reliability of the measure. This means, for example, that in the case of EP1, with a value of 0.306, the Own Emotions ability explains 31% of its variance. The rest is explained by its unique factor or EP1 error.

The convergent validity proves that the constructs that are expected to be related are in fact related. The discriminant validity (or divergent validity) proves that the constructs that were not supposed to have any relationship in fact do not have it. As can be observed in table 10, the values of AVE are superior to 0.5 and the CR values are superior to 0.7, therefore, it is shown that the research has both types of validity, and it can be considered that it has an excellent construct validity (Hu, 1999).

Table 10: Convergent validity

	CR	AVE	MSV	MaxR(H)	F1	F2	F3	F4
F1	0,806	0,513	0,301	0,827	0,717			
F2	0,810	0,520	0,260	0,845	0,510***	0,721		
F3	0,849	0,587	0,301	0,866	0,549***	0,362***	0,766	
F4	0,872	0,631	0,233	0,885	0,482***	0,280***	0,455***	0,794

Source: Own Elaboration

4.3 Reliability of the instrument

No psychometric instrument can be considered valuable unless it has a consistent or reliable measure. In the case of this research, the indicator called Cronbach coefficient alpha was used to measure the internal consistence of the instrument (Aiken, 2003). As can be observed in tables 11 and 12, the values obtained in Cronbach alpha are superior to 0.75, which demonstrated the internal consistence of the instrument. (Aiken, 2003).

Table 11: Cronbach Alpha Instrument

Cronbach Alpha	Number of Elements
0,872	16

Source: Own Elaboration

Table 12: Cronbach Alpha when eliminating a variable

	Average scale if the element has been deleted	Variance scale if the element has been deleted	Total element Correlation corrected	Alfa de Cronbach Alpha is the element has been deleted
EP1	60,923	53,817	0,468	0,867
EP2	60,709	53,092	0,592	0,862
EP3	60,678	53,281	0,550	0,863
EP4	60,521	53,074	0,583	0,862
EO1	61,172	54,020	0,486	0,866
EO2	61,027	53,580	0,457	0,868
EO3	61,019	53,603	0,393	0,872
EO4	61,115	53,587	0,526	0,864
UE1	60,552	53,210	0,544	0,864

UE2	60,563	54,255	0,438	0,868
UE3	60,533	53,035	0,564	0,863
UE4	60,322	53,673	0,623	0,861
RE1	60,904	54,418	0,446	0,868
RE2	60,893	54,381	0,487	0,866
RE3	61,111	52,422	0,469	0,868
RE4	60,889	52,661	0,640	0,860

Source: Own Elaboration

4.4 Comparison of the Level of emotional intelligence among individuals

An important aspect of this investigation is to determine if there are any differences in the levels of emotional intelligence among people that are already working in their areas and people that are still studying at university. To achieve this, the Mann-Whitney U-test was carried out (it is important to point out that the distribution of the data was not normal, even though this is a fundamental requirement to perform the validation of the instrument, there is a degree of flexibility against this in where authors such as Esposito (1993), suggests that the kurtosis should be less than 3.3 and even Kine (2005) proposed a value up to 10) using Spssv23 program and the results are presented in table 13. As observed in the previous table, there are differences between the intelligence and emotional measures among people that work and the students, who had the lowest scores.