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**Critical analysis of circular economy in
emerging Latin American countries**

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Index

Figure Index	5
Table index	6
Graph Index	7
Sommario	9
Abstract	10
1. Introduction	11
1.1. General Concept	11
1.2. Literature review	11
1.2.1. Definition of circular economy	12
1.2.1.1. Historical background.....	12
1.2.1.2. Comparison between linear economy and circular economy.....	14
1.2.1.3. Circular Economy principles.....	21
1.3. Social innovation	23
2. Peru and Colombia Socio - Economic Analysis	27
2.1. Socio economic context in Peru	27
2.1.1. Population.....	27
2.1.2. Urbanization in Peru	29
2.1.3. Population composition.....	30
2.1.4. Poverty	31
2.1.4.1. Inequality.....	32
2.1.4.2. Socio economic status	33
2.1.5. Macro-economics characteristics	39
2.1.5.1. Main productive sectors.....	40
2.1.5.1.1. Agricultural sector	40
2.1.5.1.2. Industry and services.....	41
2.1.5.2. Main investment sectors.....	42
2.1.5.3. Main import - export area	43
2.1.5.3.1. Exports.....	43
2.1.5.3.2. Imports	44
2.1.5.3.3. Trade Balance.....	44
2.2. Socio economic context in Colombia	45
2.2.1. Population: composition and characteristics	45
2.2.2. Urbanization in Colombia	47
2.2.3. Population composition.....	48
2.2.4. Poverty	49
2.2.4.1. Inequality.....	52
2.2.4.2. Social classes in Colombia: “estrados”	52
2.2.5. Evolution of Colombian social classes over time	55
2.2.5.1. Economic view	57
2.2.6. Main industrial sectors in Colombia.....	59
2.2.6.1. Services.....	60
2.2.6.2. Agriculture.....	60
2.2.6.3. Manufacturing.....	60

2.2.6.4. Industry	60
2.2.6.5. Colombia imports and exports.....	61
2.2.6.5.1. Exports.....	61
2.2.6.5.2. Imports	62
2.2.6.5.3. Trade Balance.....	62
2.3. Conclusions	63
3. Evaluation system	65
3.1. Quantitative evaluation system.....	65
3.1.1. Evaluation system characteristics	65
3.1.1.1. Indicators analysis.....	66
3.1.1.2. Existing indicators overview	66
3.1.1.3 Material Flow analysis	70
3.1.1.4. Proposed indicators	74
3.2. Qualitative Analysis	79
3.2.1. Context Definition.....	79
3.2.2. Stakeholder Analysis	80
3.2.3. Value Chain Definition	82
3.2.4. Impact Description.....	83
3.3. Evaluation system potential barriers.....	84
4. Practical Examples.....	86
4.1. Building a Sustainable and Competitive Cocoa Value Chain in Peru	86
4.1.1. Context Definition.....	86
4.1.2. Stakeholder Analysis	87
4.1.3. Value Chain Definition	90
4.1.4. Impact Description.....	91
4.2. Bioestibas: a Colombian circular and profitable business	92
4.2.1. Context Definition.....	93
4.2.2. Stakeholder Analysis	94
4.2.3. Value Chain Definition	96
4.2.4. Impact description	98
5. Conclusions.....	99
5.1. Description of the Methodology	99
5.2. Final Conclusions	100
5.2.1. European companies' advantages.....	102
5.2.2. Latin American countries advantages:	103
6. Bibliography.....	107
Annex A.....	1
Annex B.....	1

Figure Index

Figure 1 - Linear business model.....	14
Figure 2 - Commodity prices indices	15
Figure 3 - Circular economy diagram	19
Figure 4 - Circular economy value surces	21
Figure 5 - Social innovation phases.....	24
Figure 6 - Map of main production activities	42
Figure 7 - Colombia population density	47
Figure 8 - Material flow stages	72
Figure 9 - Qualitative analysis diagram	79
Figure 10 - Context definition diagram.....	80
Figure 11 - Stakeholders analysis diagram	81
Figure 12 - Stakeholder map representation	82
Figure 13 - Value chain definition analysis	83
Figure 14 - Description of value chain stages	83
Figure 15 - Example of value chain	83
Figure 16 - Impact description diagram	84
Figure 17 - Cocoa farms.....	86
Figure 18 - Cocoa value chain	91
Figure 19 - Bioestibas product	93
Figure 20 - Bioestibas value.....	93
Figure 21 - Input materials	97
Figure 22 - Main activities	97
Figure 23 - Main proces output	97
Figure 24 - Main proces outcome	98
Figure 25 - Country's energy flow	1

Table index

Table 1 - Core elements of social innovation	24
Table 2 - Comparison between positive and negative factors of poverty reduction..	32
Table 3 – Peru socio economic status description	35
Table 4 - Metropolitan Lima Data.....	37
Table 5 - Urban Peru Data	38
Table 6 - Urban + Rural Peru Data	39
Table 7 – Main Peru export products.....	43
Table 8 – Main Peru import products.....	44
Table 9 – Main Peru destinations	44
Table 10 - Main Peru origins	45
Table 11 – Indigenas Population per departement	49
Table 12 - Colombia socio economic status description	55
Table 13 - Main Colombia Export products	62
Table 14 - Main Colombia Import products	62
Table 15 – Main Colombia destinations.....	63
Table 16 – Main Colombia origins	63
Table 17 - Existing set of indicators for organization	70
Table 18 - Existing set of indicators for consumption.....	74
Table 19 –Value chain proposed indicators	77
Table 20 - Natural resources proposed indicators	78
Table 21 - Practical cases context analysis.....	1
Table 22 - Practical cases stakeholder analysis	2
Table 23 - Practical case value chain	3
Table 24 - Practical case Impact analysis	4

Graph Index

Graph 1 - Population in millions	28
Graph 2 - Population growth	29
Graph 3 - Urban population on total population	29
Graph 4 - Population age structure.....	30
Graph 5 - Average number of born children per woman.....	31
Graph 6 - Peru GINI Index	33
Graph 7 - Expenses distribution for each NSE.....	36
Graph 8 - Distribution of socio-economic status in Metropolitan Lima	37
Graph 9 - Distribution of socio-economic status in Urban Peru.....	38
Graph 10 - Distribution of socio-economic status in Urban + Rural Peru.....	39
Graph 11 - GDP trend in last years.....	40
Graph 12 - Distribution of main sector investments	42
Graph 13 - Evolution of Colombia population.....	46
Graph 14 - Percentage of urban population out of total population.....	48
Graph 15 - Population age composition	48
Graph 16 - Caribbean Region poverty.....	51
Graph 17 - Inland cities poverty	51
Graph 18 - Social classes evolution over time	56
Graph 19 - Percentage of population for each "estrato"	57
Graph 20 - GDP annual evolution.....	59
Graph 21 - GDP sectors composition	59
Graph 22 - Context Analysis Diagram - Peru practical case.....	87
Graph 23 – Stakeholder analysis Diagram – Internal - Peru practical case.....	88
Graph 24 - Stakeholder Diagram – External - Peru practical case.....	89
Graph 25 - Impact diagram - Peru practical case.....	92
Graph 26 – Context definition Diagram - Colombia practical case	94
Graph 27 - – Stakeholder analysis Diagram – Internal - Colombia practical case....	95
Graph 28 - – Stakeholder analysis Diagram – External - Colombia practical case ..	96
Graph 29 . – Impact description Diagram - Colombia practical case	98
Graph 30 - TPES trend.....	2
Graph 31 - TPES/GDP trend.....	3
Graph 32 - TPES/Population trend	4

Graph 33 - Peru electricity production	5
Graph 34 - Colombia electricity production	5
Graph 35 - Renewable energy/Total energy	6
Graph 36 - CO2 emissions in air.....	6
Graph 37 - CO2/GDP trend.....	7
Graph 38 - CO2/Population trend	8
Graph 39 – Colombia urbanization	Graph 40 - Peru urbanizatio.... 8

Sommario

Al giorno d'oggi è sempre più diffusa la consapevolezza dei problemi relativi all'ambiente e le criticità di tipo sociale che hanno un effetto sia sul nostro pianeta che sui suoi abitanti. Risulta chiaro come l'attuale modello di economia lineare non è più sostenibile nel lungo periodo e, pertanto, un cambio radicale si ritiene necessario. In questo frangente nasce l'idea della Circular Economy, che viene considerata come una potenziale soluzione ai due grandi problemi sopra citati.

Il concetto nasce in Europa e negli Stati Uniti, tuttavia è facile intendere come questo rappresenti un'opportunità unica per i paesi con economie emergenti. In questo contesto, mentre in Europa si tratta di una transizione verso la sostenibilità, per i paesi del sud america esiste la considerevole possibilità di indirizzare direttamente lo sviluppo economico verso la circolarità e la sostenibilità.

Sfruttando l'opportunità di un'esperienza in loco, è stato possibile, grazie alle università e istituti locali, avere un riscontro reale della situazione e interessanti spunti strategici sullo sviluppo di modelli di business basati sull'economia circolare. Pertanto è stato possibile procedere con un'accurata analisi socio-economica dei rispettivi paesi, con il valore aggiunto di non trattarsi di una mera analisi teorica ma basata sull'esperienza e il riscontro di casi reali di interesse accademico sulle prime applicazioni di modelli di economia sostenibile.

Conclusa la fase di analisi della letteratura e socio economica, è emersa la domanda chiave: "How European companies can develop innovative and sustainable business model based on circular economy principles in Latin America?". Partendo da questo quesito, l'obiettivo della presente tesi è studiare la fattibilità di un business model basato sull'economia circolare che permetta la collaborazione dei due continenti e porti vantaggi ad entrambi in termini della "triple bottom line" della sostenibilità, che si sviluppa in termini economici, ambientali e sociali.

Per fare ciò è stato sviluppato un sistema di valutazione che dia un'immagine completa dell'attuale stato di sviluppo dell'economia circolare e metta in evidenza dove e come sviluppare eventuali business di collaborazione basati sulla circolarità. In particolare il sistema è caratterizzato da un'analisi quantitativa costituita da appositi indicatori e un framework di tipo qualitativo che identifichi il contesto, il prodotto, gli stakeholder coinvolti e l'impatto dei casi reali riscontrati.

A seguito dell'analisi di diversi casi pratici e di una comparazione tra Europa e America Latina in termini di economia circolare e contesto di sviluppo si è cercato di giungere ad una soluzione di business innovativa, sostenibile e profittevole dal punto di vista economico per entrambe le parti coinvolte. In particolare si è pensato ad una social venture tra imprese locali e compagnie Europee interessate ad investire in America Latina. Questa potenziale soluzione tiene conto di tutti i punti cruciali specificati in precedenza: le imprese Europee diventerebbero portatrici di tecnologia e know-how insieme a fondi che provengono da soluzioni innovative di social finance mentre, le imprese locali rappresentano la chiave di accesso al mercato e la passibilità per le imprese europee di essere accettati dalle comunità e sponsorizzati dai governi locali.

Abstract

Nowadays worries regarding environmental problems are always raising up more, which are being connected with social issues that have an impact both on our planet and its inhabitants. It results quite clear that the actual linear economic model is not sustainable in the long term thus making a radical change necessary. This instance gave the birth to the Circular Economy idea, which is considered as a potential complete solution to the two problems previously mentioned.

The concept was born in EU and the US and it is easy understandable how this represents a unique opportunity for developing countries. In this context, while in EU this constitutes a transition to sustainability, for Latin America countries it is a possibility of directly addressing the economic development towards circularity.

Taking advantage of an on-site opportunity, it was possible, thanks to the university and the local institutions, to have a practical response of the situation and interesting strategic insights about the development of circular economy based on business models. Therefore, it has been possible to go ahead with a precise socio-economical analysis of both countries. The added value is that it is not only a pure theoretical analysis but based on experience and real cases of academic interests about one of the first implementation of sustainable economic models.

Being done with the literature review and socio-economic analysis, the following key question comes out: “How European companies can develop innovative and sustainable business model based on circular economy principles in Latin America?”. Starting from this question, the goal of this study is to consider the feasibility of a business model based on circular economy, which allows the collaboration of the two continents and bring advantages for both of them in terms of the sustainability triple bottom line, whose drivers are economic, social and environmental streams.

For doing so it has been developed an evaluation system which provides a full picture of the actual level of development of circular economy and highlight where and how to develop new business collaboration based on circularity. In particular, the system is characterized by a quantitative analysis based on specific indicators and a qualitative framework able to identify the context, the product, the involved stakeholders and the impact of real cases considered.

After having performed an analysis on several practical cases and a comparison between Europe and Latin America in terms of circular economy and developing context, it has been sought for an innovative business solution, sustainable and profitable under an economic perspective for both parties involved. In particular, there has been proposed a solution based on a social venture among local and European companies, interested in investing in Latin America. This potential solution takes into consideration all the key points previously specified: European companies would carry technologies and expertise along with funds coming from social finance innovative solutions, while local companies would represent the key access to the National market and the possibility for European companies to be accepted by local communities and sponsored by local governments.

1. Introduction

1.1. General Concept

Circular Economy concept has been defined with the purpose of radically change the traditional linear system of production and consumption, including sustainable work generation, without compromising the ecosystem functionalities and maintaining a sustainable usage of raw materials. The last years of industrial evolution have been dominated by a linear model of production and consumption in which goods are manufactured from raw materials, sold, used and then discarded. Today waste management, resource depletion and CO₂ emission are the main problems in all countries.

The radical change is based on design systems which maintain raw material (water, soil, energy and minerals) and products value, limiting the extraction and the usage of new inputs and non renewable energies. This design decrease waste production, reducing the negative impact on environment, climate change and human health.

The purpose of circular economy it is not only respond to the global challenges, sustainability and preservation of biodiversity, the aim is also to create value and improve the socio-economic context.

In conclusion, the circular economy is based on principles such as diversity, resilience and system circular thinking which requires a metabolic focus which considers both biological and technical materials.

1.2. Literature review

Before discussing the core of the thesis, it is important to understand the macro phenomena of the circular economy. In particular, the focus is on the general benefits that these kind of practices and models bring to the society and an emerging country economy. Data reported comes from secondary sources, stating from the Ellen MacArthur Foundation's report, a foundation born in 2010 with the purpose to raise the awareness of circular economy. The Foundation cooperates with seven big global partners (Cisco, Google, H&M, KingFisher, Philips, Renault and Unilever) to develop together initiatives of circular business and support the different countries in the implementation of them. The topic has been elaborated through other Ellen

MacArthur's paper, scientific studies and studies of big consulting companies such as EY, McKinsey and Accenture.

1.2.1. Definition of circular economy

The Ellen MacArthur Foundation affirms “the linear ‘take, make, dispose’ economic model relies on large quantities of cheap, easily accessible materials and energy and is reaching its physical limits”, while Gustavo Michelinia and Aldo R. Ometto in *From linear to circular economy: PSS conducting the transition* considers that “the circular economy brings the idea of restoration and circularity in order to replace the traditional concept of end-of-life, shifting towards the use of renewable energy, eliminating the use of toxic chemicals, and aims for the elimination of waste through the superior design of material, products, systems and business models”. The circular economy is an attractive and viable alternative that businesses are already exploring today.” Zhu Q, Geng Y and Lai KH consider “the main point of the circular economy concept is to capitalize on material flow recycling and to balance economic growth and development with environmental and resource use” which express another main focus of this new business model: a sustainable use of resources and the potential benefits for the environment. Being a new concept it is not possible to unequivocally define it, for this reason in the following paragraphs are reported the basic concept behind the principles and an accurate description of the best practices.

1.2.1.1. Historical background

There are several historical concepts that come before a real definition of circular economy and could be interesting for the understanding of how the concept has been developed.

Walter R. Stahel in 1976 theorized how an economical cycle could create new job opportunities, reduce the consumption of raw materials and preserve the life of a product making them last longer. Following some historical steps after Stahel theories and coming from different schools of thought are reported:

Permaculture: introduced by Mollison and Holmgren at the end of 70s’ regarding human settlements and a system design considering principles such as reproduction of natural ecosystems and ecological principles. It is introduced also the concept of

reasonable and sustainable usage of natural resources.

Ecological Industry: introduced by R. Frosch who analyzed materials and energy flows in industrial systems. He theorized the possibility of reducing energy usage and material consumption through the minimization of scraps. A similar concept is the “industrial symbiosis” introduced in 40s’. It describes how a network of diverse organizations can foster eco-innovation and long-term culture change, creating and sharing mutually profitable transactions and improve business and technical processes.

Cradle to Cradle design: introduced by W. Stahel and successively by McDonough and M. Braungart. The Cradle to Cradle (C2C) suggests that industry must protect and enrich ecosystems and nature's biological metabolism while also maintaining a safe, productive technical metabolism for the high-quality use and circulation of organic and technical nutrients. It seeks to create systems that are not only efficient but also essentially waste free. The model in its broadest sense is not limited to industrial design and manufacturing; it could be applied to many aspects of human civilization such as urban environments, buildings, economics and social systems.

Biomimicry: at the end of 90s’ J. Benyus introduced this concept, and it was basically used in bio-architecture. It has two basic principles: first of all, nature as a model to emulate infinite processes (closed-loop), secondary nature as a precept, looking at natural process as a guideline to create economical and social management standards.

Nowadays, circular economy concept has been introduced by Ellen MacArthur Foundation. They consider circular economy as the radical change that have to be implemented at a political and economic levels, globally and locally, within multinational, middle or small companies. The circular economy is restorative and regenerative by design and aims to keep products, components, and materials at their highest utility and value at all times, distinguishing between technical and biological cycles. This new economic model seeks to ultimately decouple global economic development from finite resource consumption. It is conceived as a continuous positive development cycle that preserves and enhances natural capital, optimises resource

yields, and minimises system risks by managing finite stocks and renewable flows. It enables key policy objectives such as generating economic growth, creating jobs, and reducing environmental impacts, including carbon emissions.

1.2.1.2. Comparison between linear economy and circular economy

In the linear economy, as it was born in the industry revolution, industries extract materials, apply energy to transform it in finished products and sell them to customers, who throw them away when they are at last stage of product life cycle or when they do not need them anymore. Even if industries over the years tried to exploit as good as they could all materials used for production, this model contains different sources of waste across the whole supply chain.

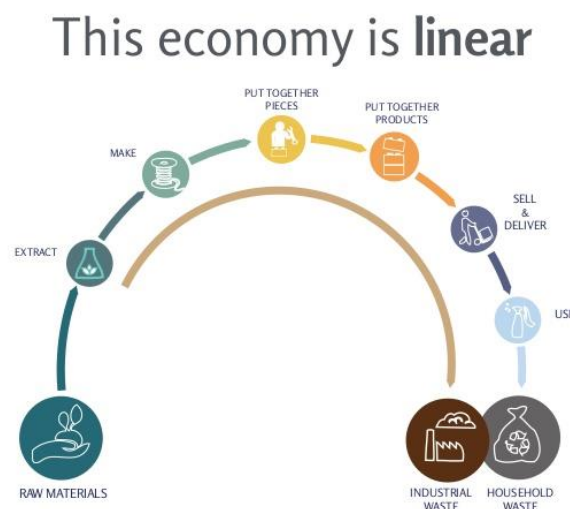


Figure 1 - Linear business model

First of all, a big quantity of materials is wasted in the extraction and production phases. For example, the Sustainable Europe Research Institute (SERI) has estimated that every year the production of goods in European countries consume 21 billion tons not included in the final product. This is due to an excess of material extracted from mines or system production wastes generation. Secondary, a big generation of wastes is due to the low rate of recycling and reuse of the end of life products (Eurostat Statistics). Today recycling rate are significant only for some materials, mainly the ones manufactured with high and omogenous volumes. For example, in a report of UNEP (United Nation Environment Program) “*International*

Resource Panel Recycling Rates of Metals – a status report. 2015” it is highlighted how only 1/3 out of 60 metals considered has a 25% or more of recycled rate, which means a significant of materials such as gold, aluminium or copper. Finally, there is a significant waste of energy in last step of supply chain, especially during the transformation of raw materials in finished products.

In last years most of the companies start questioning about the risk exposition implied in the linear system. In particular, two phenomena represent a big threat for profitability: the scarcity and the volatility of the price of raw materials. As shown in the figure 2 (source: IndexMundi) commodity prices increased over the years representing a big challenge for companies which has to satisfy markets necessities.

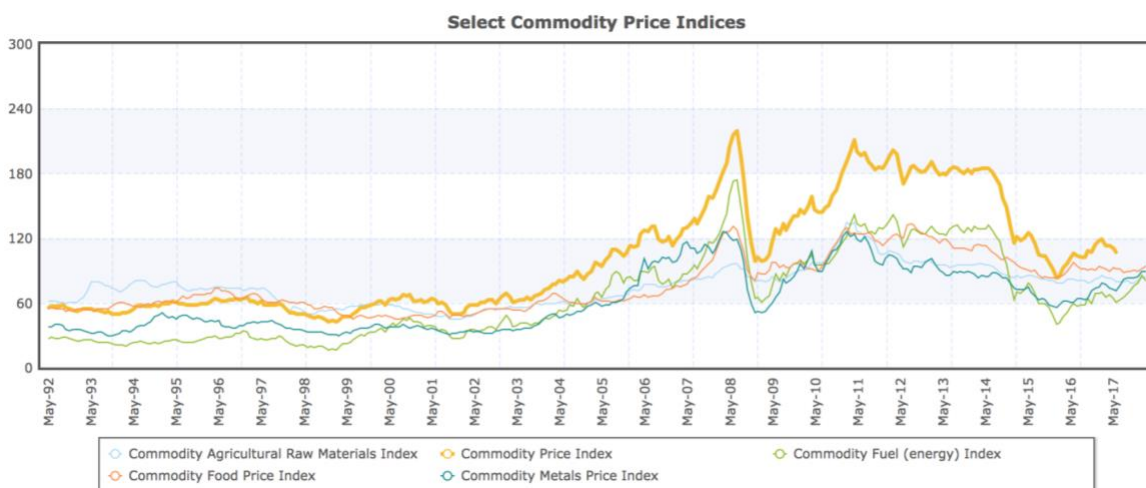


Figure 2 - Commodity prices indices

Several factors indicate that resource scarcity, price squeezes, and volatility will continue constantly or increase. Here we outline some of the most important challenges of matching future resource needs:

- Demographic trends:** the world faces a unique demographic challenge over the years that from an economical perspective was more difficult to manage than the population aspects. China and India, the two largest countries by population, are each ready to undergo a significant economic transition in coming decades. China, starting in 1982, took only 12 years to double its per-capita GDP from USD 1,300–2,600, and India, starting in 1989, took only 16 years to achieve the same doubling (*Source: Angus Maddison; University of*

Groningen). It took the United Kingdom 154 years to make the same transition. McKinsey forecasts the emergence of three billion new middle-class consumers by 2030, led by economic growth in these two countries and other rapidly growing emerging market economies, such as Latin America. This mass of new spenders will have significant impact on resource demand, a prospect that underlines the potential value of introducing circular economy principles into business models sooner rather than later.

- **Infrastructure needs:** besides more infrastructure for a larger population, the world will also need to expand its infrastructure to get at harder-to-access resources. Newly discovered reserves do exist, but discovering them will require huge investment in infrastructure and technologies. McKinsey estimates that meeting future demands for steel, water, agricultural products, and energy would require a total investment of around USD 3 trillion per year. If it will not be possible to realize it, the result could be continued supply constraints.
- **Political risks:** Recent history shows the impact political events can have on commodity supply. There are numerous historical instances in which political events have triggered commodity price picks. Some examples are: in 1972 Arab oil embargo, the export declines following the 1978 Iranian revolution or a third is the price shocks following Iraq's invasion of Kuwait in 1990 (*Oil markets and Arab unrest: The Price of Fear*, *The Economist*, March 3, 2011). Some commodities are particularly vulnerable: more or less half the new projects to develop copper reserves are in 34 countries with high political risk such as Peru and Colombia. Roughly 80% of all available arable land on earth lies in areas affected by political or infrastructural issues. Some 37% of the world's proven oil reserves, and 19% of proven gas reserves, are also in countries with a high level of political risk. Political decisions also drive cartels, subsidies, and trade barriers, all of which can trigger or worsen resource scarcity and push up prices and volatility levels (*Political risk as per the Economist Intelligence Unit's Political Instability Index. Countries scoring more than 5.0 on 'underlying vulnerability' are classified as 'low political stability'*).
- **Globalised markets:** the integration of financial markets and the globalization of supply chain mean that regional price shocks can quickly become global. There are many examples in recent history, from the impact that Hurricane Ike

in the Gulf of Mexico had on energy markets, to the air travel chaos caused by the eruption of the Eyjafjallajökull in Iceland, to the supply chain disruptions ensuing from the Fukushima disaster in Japan. This trend is likely to continue and, in all likelihood, to become more acute as emerging markets integrate more thoroughly into global value chains and financial systems.

- **Climate change:** some resource industries could face significant problems from variations in climates, particularly water and agriculture. The U.S. Environmental Protection Agency suggests that changes in climate could affect snow cover, stream flow, and glacial patterns and consequently fresh water supply, erosion patterns, irrigation needs, and other management requirements (*Climate Change Indicators: Snow and Ice*, from: Climate Change Indicators Report, U.S. Environmental Protection Agency, 2010). Supply constraints and uncertainty would likely drive up prices and volatility. McKinsey research suggests that by 2030, the disparity between global water demand and water supply could reach 40%, driven in large part by increased demand for energy production, which is highly water-intensive.

The mentioned dynamics are a threat for growing economies because they increase the market uncertainty, discouraging investments and increasing the cost related to the risk protection of the supply chain. The circular thinking answers to these issues substituting the concept of consumption with the reuse. Starting from existing systems, the main idea is to act on the entire system and not only on singular parts or components, thanks to a sustainable material flow management. In particular, there are two different flows, as they are described by McDonough and Braungart (*Resource Revolution: Meeting the World's Energy, Materials, Food, and Water needs, McKinsey Global Institute*): biological materials and technical materials. Biological materials are designed to be readmitted in the biosphere at the end of their usage and regenerate natural capital. Example of this kind of materials are biodegradable tissues or cosmetics: they are subjected to anaerobic digestion or composting before re-enter in natural environment.

On the other hand, technical materials are man-made and design to recirculate in the economy maintaining the maximum possible quality using the minimum quantity of

energy. Examples are household appliances or technical devices which are subjected to treatment such as maintenance, repair, rework before being recycled and reverted in raw materials. The figure 3 represents the different flows inside the circular economy. As it is possible to see, the final objective is to generate cyclical metabolisms defined “cradle-to-cradle” which allows to store materials and their original value or functionalities. Extend the life cycle of materials and products, exploiting as much as possible their potentialities, allows to raise the economy from waste management problem with a long term vision.

With the purpose of facilitate these circles, in circular economy products are designed in order to be easily reusable and ready for disassembly processes. At the same time, they have to be reusable and recyclable supporting the principle stating that the growth of the economy is based on the reuse of a huge amount of materials from the end-of-life products and not extracting new raw materials. Biological materials are naturals and not toxic and can be simply composting, while technical materials, such as different polymers, metal alloys or other artificiale components are designed to be reused to maintain the maximum value. Modularity, standardization and versatility are priority aspects in products’ architecture, in this way they could last longer and could be easily adaptable to different uses.

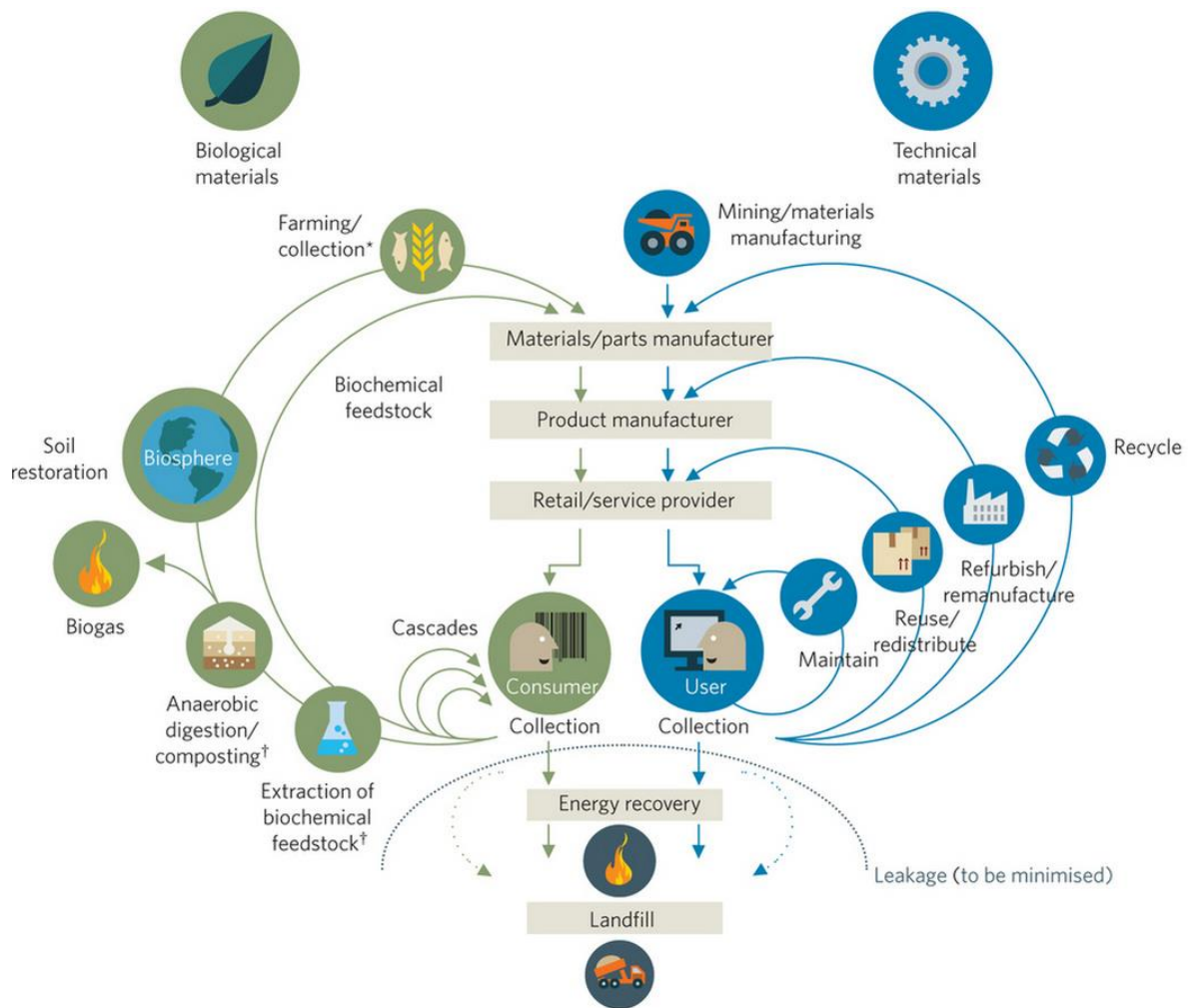


Figure 3 - Circular economy diagram

Upstream in supply chain, it is important to preserve and improve natural capital adjusting the use of final products and balancing renewable resources. The best practices to be implemented are: regenerations, virtualization and exchange of resources. At operations level, from components' production to recollection of products from consumption points, it is necessary to optimize resource performances producing products and components which are really necessary for final users. As mentioned before, also in this part of supply chain the recommended practices are: regeneration, share, optimization and recycle. Finally, for what concern disposal and residual energy recovery, it is necessary to improve the efficiency of the systems. The best practices are the same reported above (Source: *Foundation, Ellen MacArthur. Toward the Circular Economy Vol.3: Accelerating the scale-up across global supply chains. 2014*).

In order to generate potential value the circular economy uses four different circles

depending on products, component, system geography or segment of the (global) supply chain considered (figure 4):

Inner cycle: the smaller the circles, the larger the savings in the embedded costs in terms of material, labour, energy, capital and of the associated externalities, such as CO₂ emissions, water, or toxic substances. Given the inefficiencies along the linear supply chain, smaller circles will also benefit from a comparatively higher virgin material substitution effect. This opportunity revealed by contrasting the linear to the circular setup is the core of their relative economic value creation. In case the costs of collecting, re-processing, and returning the product, component or material into the economy is lower than the linear alternative, setting up circular systems can make economic sense. With increasing resource prices and higher end-of-life treatment costs, this arbitrage becomes more attractive.

Circling longer: a core value creation potentially derives from keeping products, components, and materials in use for a longer period of time within the circular economy. This can be done by either going through more consecutive cycles or by spending more time within a cycle. Rising resource prices render this value-creation lever more attractive. Increased operating and maintenance costs, however, and/or losing out against efficiency gains due to rapid innovation of the product, could eat up this positive arbitrage potential.

Cascades and inbound material/product substitution: while previous value creation levers refer to reusing identical products and materials within the circular setup, there is also an arbitrage opportunity in the cascading of products, components or materials across different product categories. In these cascades, the arbitrage value creation potential is rooted in the lower marginal costs of reusing the cascading material as a substitute for virgin material inflows and their embedded costs (labour, energy, material) as well as externalities against the marginal costs of bringing the material back into a repurposed use.

Input materials: the power of this major driver is a further enhancement to the above mentioned value creation potential and offers an additional set of benefits. To generate maximum value, each of the above levers requires a certain purity of material and

quality of products and components. Currently, many post-consumption material streams become available as mixtures of materials, either because of the way these materials were selected and combined in a previous single product or because they are collected and handled without segmentation and without regard for preserving purity and quality. Scale economies and efficiency gains in the reverse cycle can be obtained through improvements in the original design of products, such as ease of separation, better identification of embedded components, and material substitution, and in the reverse processes, such as reduced product damage rates during collection and transportation, lower reconditioning scrap rates, and reduced contamination of material streams during and after collection. These improvements to the product and the reverse cycle process translate into further reductions of the comparative costs of the reverse cycle while maintaining nutrients, especially technical ones, at higher quality throughout the cycles, which typically extends longevity and thus overall material productivity. Beyond the performance of the reverse cycle, keeping toxic materials out of the product design can bring other measurable advantages.

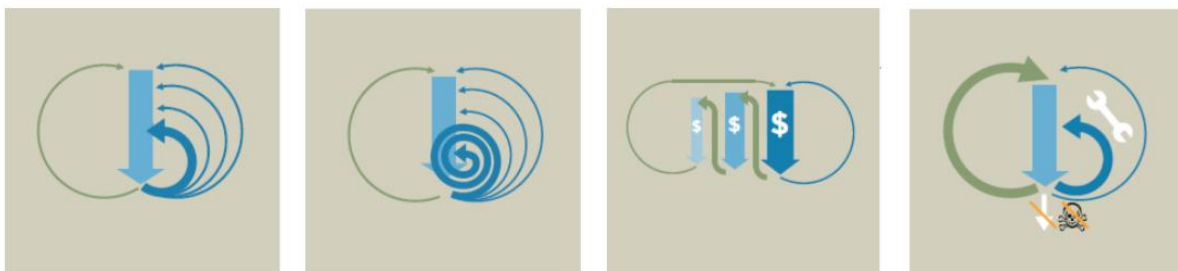


Figure 4 - Circular economy value surces

1.2.1.3. Circular Economy principles

Starting from what mentioned before, more in detail, the circular economy generates value through different principles:

Preventing waste generation: through the redesign of the production phases it is possible to integrate and improve raw material cycles usage. In this way it is possible to generate the lowest quantity of scraps. Another way to interpret this principle is thinking to give a “second life” to the product from the design for manufacturing drastically reducing raw material usage.

Flexibility: end of life products or services have to be adapted for different functionalities. This could be realized implementing modularization and a simple design. It is also important trying to reduce the obsolescence degree of the product, ensuring the future reuse.

Renewable energies: production, consumption and usage of a product requires energy resources. For their unlimited availability, this principle of circular economy suggests the exclusive usage of renewable or clean energies. In this way it is possible to reduce the negative impact of the production on the environment, reducing dangerous emissions or toxic waste.

Waste policy: probably this is the most important and innovative principle which totally change the concept of waste. Waste are now considered as a resource that can be reuse and transformed in a new raw material for a different production cycle (with the possibility to change from an industrial sector to another).

Circular thinking: changing the “way of thinking” focusing on materials flows and on close loops, leaving the old traditional concept of “take, make, dispose”.

Focus on local: communities and industries are influenced by social context and socio economic situation. Public information and knowledge sharing about new sustainable economic models such as circular economy is the basis of a correct implementation at local level.

Drop-down concept: considering the possibility of increasing natural resources value through the definition of its functionalities and try to implement a system which allows to reintroduce the products or some of the component in the same production cycle or in similar ones.

Focus on performance: performances have to be synergic and based on the creation of multiple benefits, including new added value for the product, generate employment and reducing raw material consumption. Thanks to this benefits it is possible to decrease the negative impact on the environment and increasing the socio economic welfare.

Finally, these principles are the ones that have to be apply in order to implement a sustainable and profitable circular economy system. In next paragraph, for the aim of the study, it is reported a description of the concept of social innovation, considering that circular economy is one of its paradigm.

1.3. Social innovation

Circular economy is not a concept coming from anywhere; when getting a wider point of view, it is easy to understand the starting idea is combining positive social and environmental changes with profitable business. From this approach five new economic paradigms are generated and circular economy is one of them. In general, they are all from a unique concept called social innovation. Murray, R., Caulier-Grice, J., Mulgan, G. define social innovation as “New ideas (products, services and models) that simultaneously meet social needs more effectively than alternatives and create new social relationships or collaborations. In other words, they are innovations that are both good for society and enhance society’s capacity”, while Soule, Malhotra and Clavier (*Stanford University Report, 2012*) affirm that “Social innovation is the process of developing and deploying effective solutions to challenging and often systemic social and environmental issues in support of social progress. Social innovation is not the prerogative or privilege of any organizational form or legal structure. Solutions often require the active collaboration of constituents across government, business, and the nonprofit world.”

In order to define social innovation some core elements have to be define:

Core Element	Description
Novelty	Social innovations are new to the field, sector, region, market or user, or to be applied in a new way
From ideas to implementation	There is a distinction between invention (developing ideas) and innovation (implementing and applying ideas)
Meets a social need	Social innovations are explicitly designed to meet a recognised social

need

Effectiveness	Social innovations are more effective than existing solutions – create a measurable improvement in terms of outcomes
Enhance society's capacity to act	Empowers beneficiaries by creating new roles and relationships, developing assets and capabilities and/or better use of assets and resources.

Table 1 - Core elements of social innovation

The dimensions which characterize the social innovation can be described as: the formulation of new combinations or hybrids of existing elements, the implementation of such hybrids that involve cutting across organizational, sectorial or disciplinary boundaries and the compelling social relationship that these implementations leave behind (Mulgan et al., 2007).

When a company or an infrastructure decide to follow the path of social innovation, mainly they are implementing these different stages reported in figure 5:

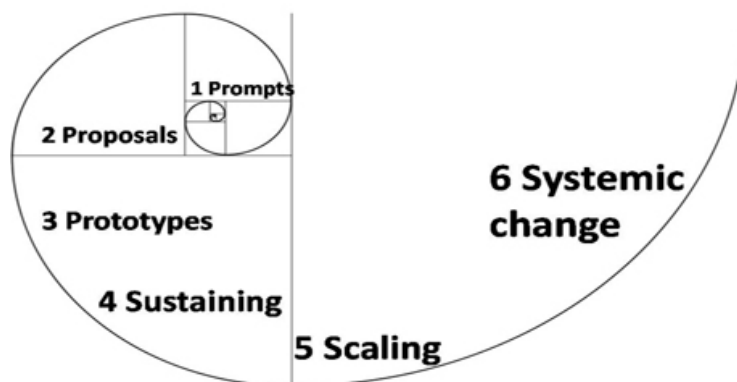


Figure 5 - Social innovation phases

These phases often are not sequential (some innovations go straight into practice or even scale), and there are feedback loops between them. They can also be seen as

overlapping spaces, with different cultures and skills. A more detailed description of each phase is now provided:

- **Prompts and inspiration:** In this phase all the factors which highlight the need for innovation as well as the inspirations which spark it are included. This stage involves diagnosing the problem and framing the question in such a way that root causes, not just symptoms, will be tackled. Framing the right question is half way to finding the right solution.
- **Proposals and ideas:** This is the moment of idea creation. This can involve formal methods – such as design or creativity methods to broaden the range of options available. Many of the methods contribute to get insights and experiences from different kind of sources.
- **Sustaining:** This is when the idea becomes real. It comprehends sharpening ideas, identifying income options to make sure the long term financial sustainability of the firm, social enterprise or charity, that will go on with innovation.
- **Scaling:** At this phase a range of strategies for growing and enlarging an innovation are available– from organisational improvement, through licensing and franchising to federations. Emulation and inspiration also have a critical role in spreading an idea or good practice.
- **Systemic change:** Systemic change usually involves the interaction of many elements: social movements, business models, laws and regulations, data and infrastructures, and entirely new ways of thinking and doing. Systemic change generally involves new frameworks or architectures made up of many smaller innovations. Social innovations commonly come up against the barriers and hostility of an old order. Systemic innovation commonly involves changes in the public sector, private sector, grant economy and household sector, usually over long periods of time.

Finally, the aim of social innovation is to enhance the internal skills of companies which decide to implement this social business model. In particular, they can do this through the strategic planning improvement and decision management, the maximization of the efficiency and the effectiveness of the activities, the project monitoring and management, the reporting capabilities improvement, the stakeholder involvement and participation growth, the motivated team thanks to

measurable objectives and the information and data management. More than these strategical and practical actions, another social innovation objective is to increase trust between the actors of supply chain to gain better profit performances.

2. Peru and Colombia Socio - Economic Analysis

This paragraph aims to clearly identify and understand the reference context. In particular, the analysis is divided first of all for the two considered countries, Peru and Colombia. The analysis is composed by a first understanding of the population composition: urbanization, gender, age and socio economic status. Secondary, it is reported the main economical activities, with a focus on import and export activities in order to understand the relationships of the two countries with world trade.

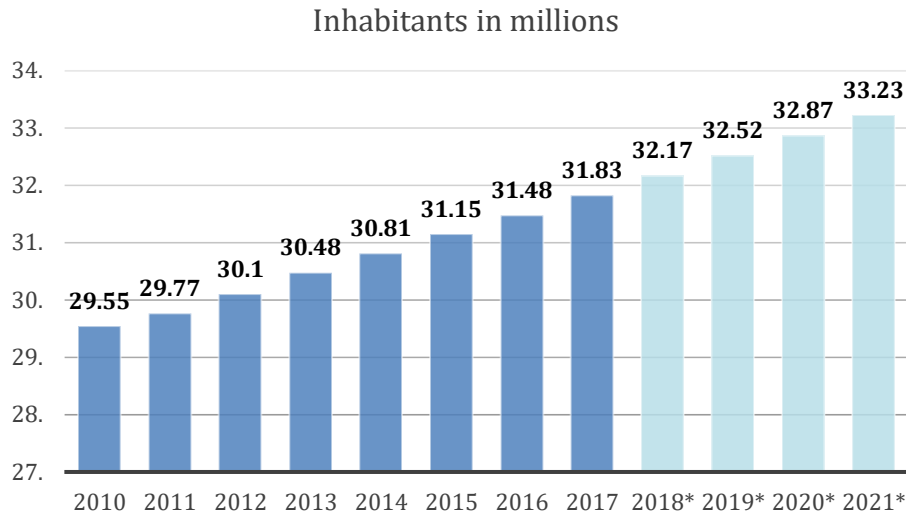
2.1. Socio economic context in Peru

Peru is a country situated in western South America. It is bordered in the north by Ecuador and Colombia, in the east by Brazil, in the southeast by Bolivia, in the south by Chile, and in the west by the Pacific Ocean. Peru is an extremely biodiverse country extended for 1.285.216 km² area and characterized by arid plains in coast regions, peaks of the Andes mountains and the tropical Amazon Basin rainforest in the east with the Amazon river. Peru is a representative democratic republic divided in 25 regions. The capital of the country is Lima, which is the most populated city. Other important urban centers are: Arequipa situated in the south west, Cusco in the south west and Trujillo which is a city in the north coast region.

It is classified as an emerging market with a high level of human development and upper middle income level. The official spoken language is Spanish (Castillano), although there are two co-official languages Quechua e Aymara.

2.1.1. Population

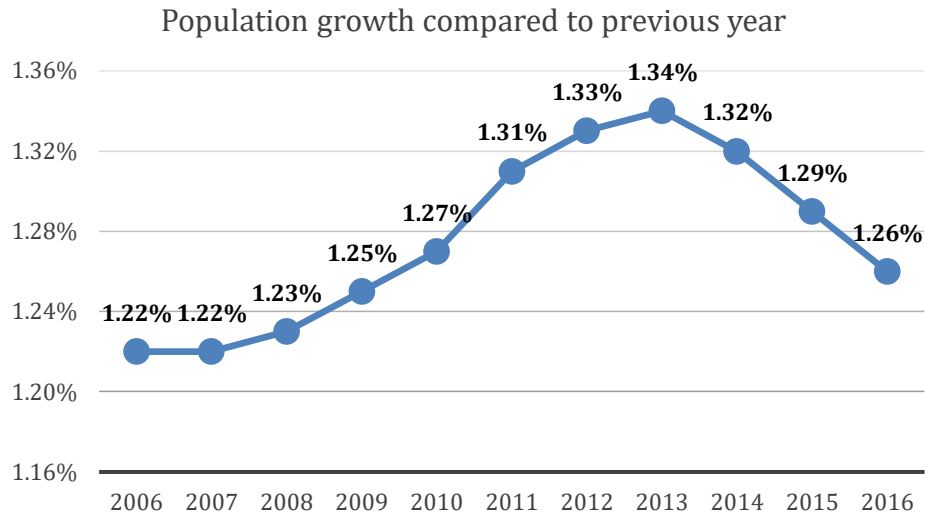
Peru counts more or less 32 million of inhabitants and it is one of the most populated country of Latin America as well as one with the highest population density (23 inhabitants/km²). In last years, the average percentage of growing population rate is around 1/1,2%. This trend is explained by an increment of the birth trend in urbanized areas.



Graph 1 - Population in millions

Peru is divided in 24 departments and a Constitutional Province. The most populated cities are: Callao, Chimbote (Ancash), Juliaca (Puno), Sullana y Talara (Piura), Chincha Alta (Ica) and Tarapoto (San Martin). In this group of cities in concentrated the 55% of the population (more or less 14 millions of inhabitants), among them 9 million live in Lima and 6 million in other cities.

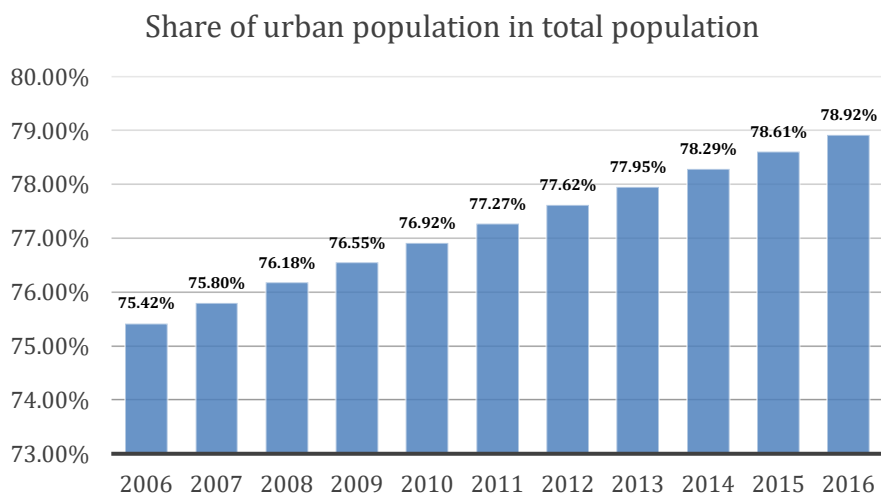
It is also important to consider the population density as indicator to understand the concentration of population in country area. As mentioned before, nowadays the population density rate is around 23/24 inh/km², which is considerably low compared for example with Italian's one (201.3/km²). The density increased a lot in last years due to and higher birth rate, an expansion of urbanized areas and relevant internal immigration phenomena. Lima and the Constitutional Province of Callao are considered the two areas with the highest density per km².



Graph 2 - Population growth

2.1.2. Urbanization in Peru

In Peru, the population distribution is associated with settlement patterns and population dispersion inside the country. Looking at recent data, rural and urban population increased differently: urban population has a growing rate of 1,3% while rural one around 3,8% yearly. As mentioned before, the most concentrated areas are the urbanized ones. If we consider it in percentage, the cost areas represent the 55% of the total population even if in recent year the population in amazonian regions is increasing while the andines one is decreasing.

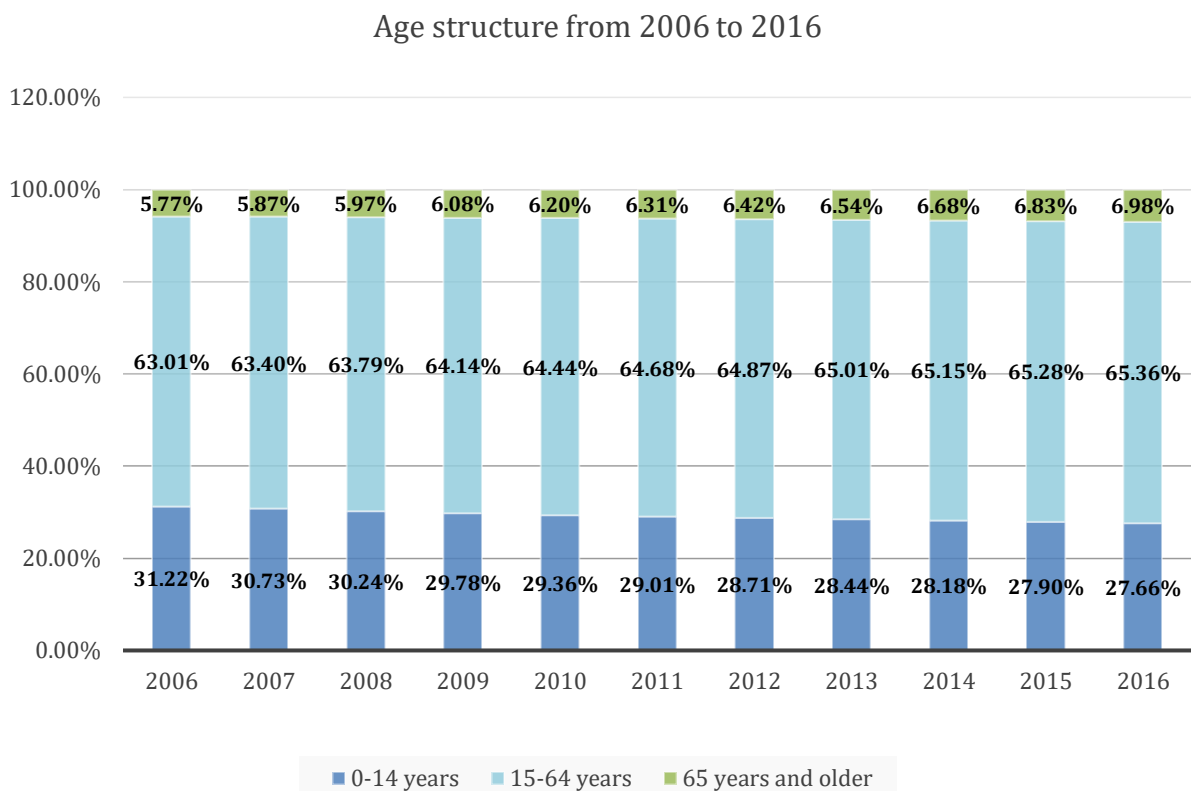


Graph 3 - Urban population on total population

This statistic shows the degree of urbanization in Peru from 2006 to 2016. Urbanization means the share of urban population out the total population of a country. In 2016, 78.92 percent of Peru's total population lived in urban areas and cities.

2.1.3. Population composition

Considering the growing rate for different ages group, it is possible to observe a different behaviour for each group which establish a structure of the population characterized by a diamond shape. In last decades the evolution of population is reflected by this shape: there has been a passage from a large base and a small top to a reduced base and a larger central part. Data shows that more or less the 30% of peruvian population is less than 15 years old. The largest band is between 15 and 64, while 65+ is a small group constant during years.

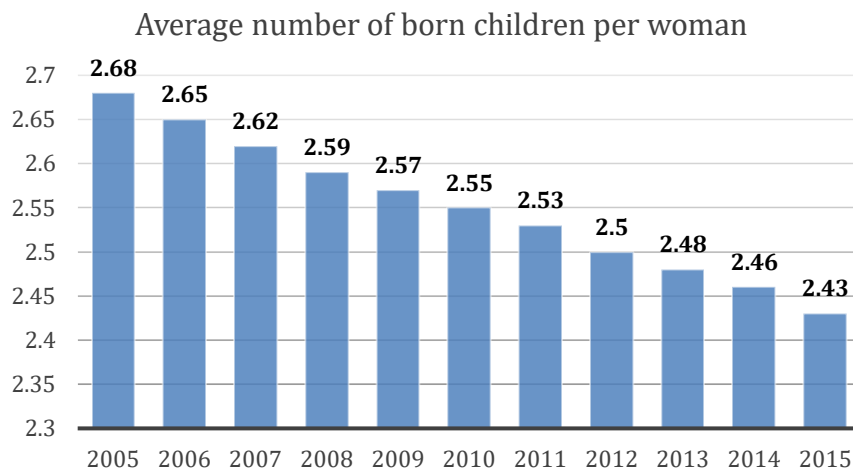


Graph 4 - Population age structure

Under a demographic perspective, there are evidence of an aging of population due to an increase of people in adult age which decide not to have children or at maximum one. Another reason could be immigration outside the country of young people, looking for jobs overseas or in North America.

Data shows that:

- The birth rate is steadily declining year by year with an average of one children for women in childbearing age. Probably this is due to a reduction in the fertility explained by an increase in educations level of feminine population and urbanization process.
- The fertility rate in adolescents (15 - 19 years old) is also decreasing. It is important to mention that in rural area adolescents have more children than in urban area due to a lower level of education and low quality life.
- Regarding the mortality rate, which allows to understand the change in the structure of population, it enhances a decrease in mortality for 1 year children and higher percentage of possibility to reach 75+ years.



Graph 5 - Average number of born children per woman

2.1.4. Poverty

Poverty is a multidimensional and complex concept and does not exist a univocal definition for it. For the purpose of this study, one definition which could approximate this multidimensionality addresses poverty as the “*inability of people to have a decent life*”. There are many aspects that define life as “*decent*”: having a long and healthy life, having access to education, freedom to express its own political opinions, respect of human rights, personal safety, access to job market with an appropriate level of salary and participation to social communities. The economic growth helped in decreasing poverty rate (from a 55% to a 35%) and determined a better distribution of the incomes (increasing job opportunities and social spending).

Thanks to this, it was possible to reach social Millennium Objective of the country focused on the development of children health and services for childhood.

During last years, poverty rate has decreased from 50% to 35%, particularly in big metropolitan cities such as Lima. This is a consequence of an improvement in the balance between income and expenditure. Also in rural areas poverty is decreasing, even if with a slower rate (actually it is around 60%).

The Instituto Nacional de Estadística y Informática (INEI) published in its annual report a comparison between negative and positive factors related to the reduction of poverty rate reported in the following table.

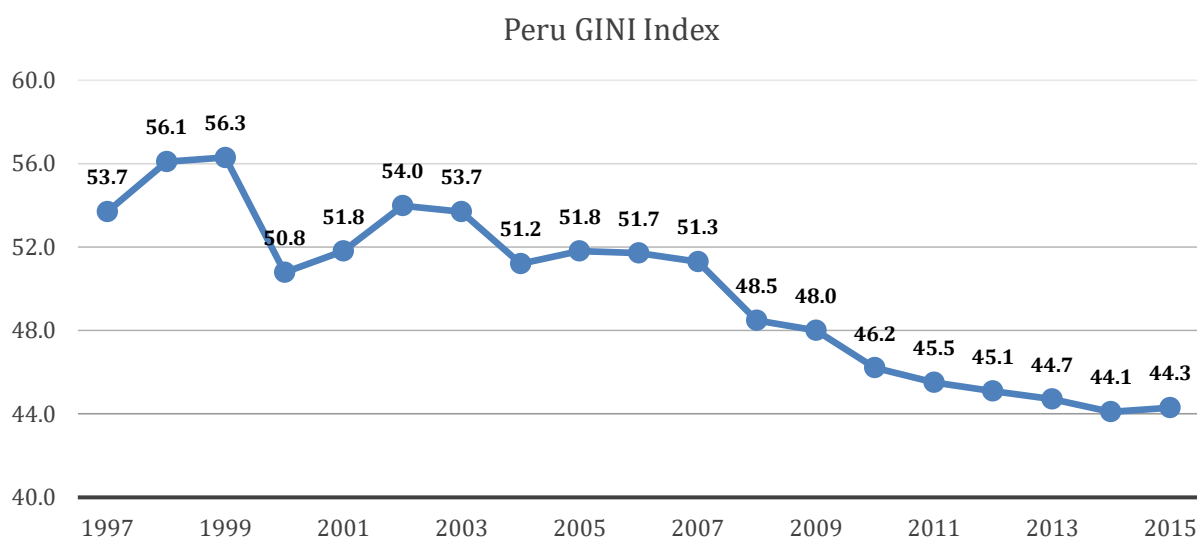
Positive factors	Negative Factors
<ul style="list-style-type: none"> ● A big improvement has been implemented regarding the extreme poverty with percentual reduction of 12% ● Significant better conditions in rural area and in small village in Andes mountains, such as healthier environment in Amazon indigenous populations ● The reduction is not concentrated just in one single area, the effort is spread along the entire country 	<ul style="list-style-type: none"> ● In some region of the coast the poverty rate as increased, even if not in a significant and alarming percentage ● Inside the Amazon forest it is not always possible to understand the real conditions of populations because they are nomade or because their logistic prevent certain kind of services

Table 2 - Comparison between positive and negative factors of poverty reduction

2.1.4.1. Inequality

In order to measure the inequality in the income of the country it is possible to use the Gini index. Gini index measures the extent to which the distribution of income (or, in some cases, consumption expenditure) among individuals or households within an economy deviates from a perfectly equal distribution. A Lorenz curve plots the cumulative percentages of total income received against the cumulative number of recipients, starting with the poorest individual or household. The Gini index measures the area between the Lorenz curve and a hypothetical line of absolute equality, expressed as a percentage of the maximum area under the line. Thus a Gini index of 0 represents perfect equality, while an index of 100 implies perfect inequality.

GINI index in Peru was reported at 44.3% in 2015, according to the World Bank collection of development indicators, compiled from officially recognized sources.



Graph 6 - Peru GINI Index

2.1.4.2. Socio economic status

Apeim, Asociación Peruana de Empresas de Investigación de Mercado, develops different income groups to divide urban and rural population of Peru.

Following some definitions are reported in order to understand the statistics:

- Homes (Hogares): group of people that occupies the whole or a part of a house, share principal meal and participate in common activities.
- Chief (Jefe de hogar): person, man or woman, of 14+ years old, who is in charge of taking main decisions and has the role of economically sustain the whole family.
- The socio-economic status it is not only based on incomes but on a set of different variables such as: employment and education level of family chief, feed, good and services and type of transportation. Considering the mentioned variables, it is possible to define five different socio-economic status reported in the following table.

Socio-Economic status	Average family income	Employment and level of education of	Feed	Good and services	Transportation
-----------------------	-----------------------	--------------------------------------	------	-------------------	----------------

		family's chief			
NSE A	S/. 10,720 monthly A part of all current expenditures they still have more than 50% of income able for personal expenses.	Entrepreneurs or executive at high level. Independent professionals or consultants. Their background is in private and high level colleges with bilingual courses.	On average they expend 2000 S/. on it. They usually go out for dinner once a week and buy food in high quality supermarkets.	They usually live in private house, most of them are own property with a medium level of technology installed. They have hot water, wifi and phones.	Own cars or taxis, they spend on average 700 S/. in gasoline.
NSE B	S/. 2,990 monthly A part of all current expenditures they still have more than 22% of income able for personal expenses.	Employees such as manager or higher level in the private sector in medium-large companies, independent professional. Their background is in private and high level colleges or some of family members went to public school. Not all of them receive university education.	On average they expend 1200 S/. on it They usually go out in fast food or national restaurants. They buy food in markets or small shops. They could have hot water.	They have their own house, with basic technologies (phone, televisions, videos). They could have hot water.	Usually public transportation. They spend on average 310 S/.
NSE C	S/. 1,490 monthly A part of all current expenditures they still have more than 3% of income able for personal expenses.	Public or private employees. Professionals in medium-small companies. They have technical studie. They usually attend public schools and universities.	On average they expend 840 S/. on it They usually go out low quality restaurants. They buy food in markets or small shops or by street vendors.	They usually have a small place to live, the level of technologies is low and basic. Usually hot water is not implemented.	They usually use public transportation or go by foot. They spend on average 175 S/.
NSE D	S/. 1,030 monthly They use all the income for general expenses.	Public employees or specialized industry workers. Chauffeurs or taxi drivers.	On average they expend 720 S/. They usually cook and eat at home, without going out	Most of the rent an apartment and divided it with others. Usually are self-build and	They use public transportation or go by foot.

		They usually have primary education in public infrastructure. Someone attend technical schools.	for dinner except for special occasions. They usually buy food in economical market in small quantities or by street vendors.	not well maintained. They don't have public water. They have basic electrodomestics.	
NSE E	S/. 730 monthly Their income is not sufficient to cover all the expenses and they need status incentives to survive.	They are public workers in construction sector, street vendors, domestic, drivers. On average they expend 60 S/. on it. Most of them don't end primary schools or attend technical courses.	On average they expend 600 S/. They usually cook and eat at home, sometimes they use social services.	They don't have their own property and where they live is not legally admitted (asientamentos humanos). They don't have public water or electrodomestic. They have just one cell for family. They don't have internet connections or TV.	They usually go by foot.

Table 3 – Peru socio economic status description

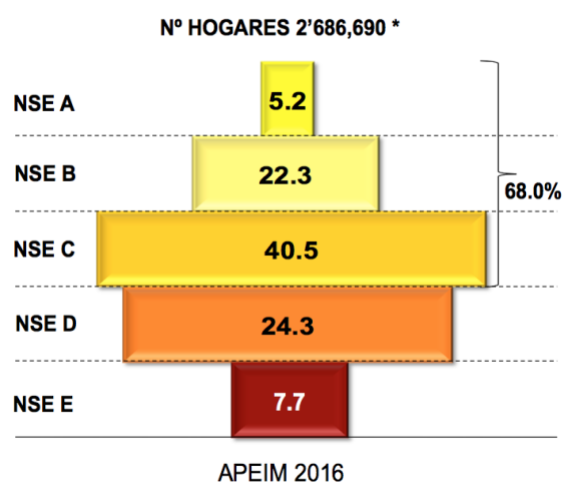
A more detailed distribution of the different expenses area is reported in graph 7:



Graph 7 - Expenses distribution for each NSE

At national level it is possible to identify 32,188 different “hogares” spread in the different 25 departments. The graphics below show the distribution of the socio economic status in Lima and in others part of Peru. For each graph is reported the related data table. All data are in percentege. For the aim of the study it is interesting to consider: Lima, Urban Peru and Urban + Rural Peru.

Metropolitan Lima



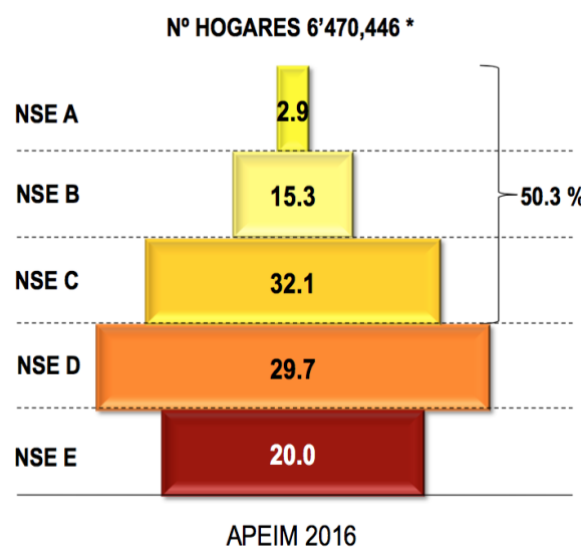
Graph 8 - Distribution of socio-economic status in Metropolitan Lima

NSE	Status	Percentage	
A	A1	0,6	5,2
	A2	4,6	
B	B1	8,6	22,3
	B2	13,7	
C	C1	26,5	40,5
	C2	14,0	
D	D	24,3	24,3
E	E	7,7	7,7

Table 4 - Metropolitan Lima Data

As in the majority of south american countries, during last years it is possible to register an extension of middle class, moving from a pyramidal society to diamond shape one. The graph represents the distribution of the different social classes in Lima, capital of Peru. Lima is the biggest urban center in Peru counting around 40% of the total population (32 million of inhabitants).

Urban Peru

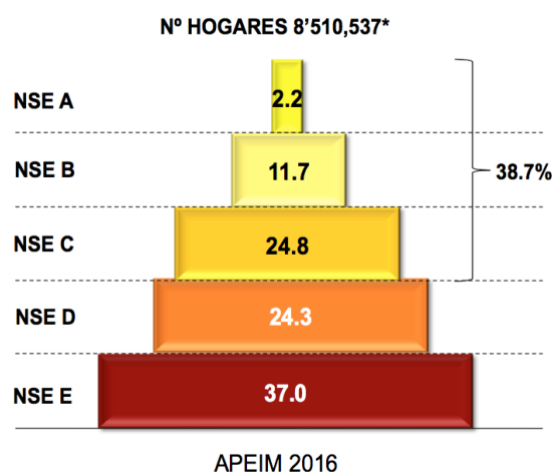


Graph 9 - Distribution of socio-economic status in Urban Peru

NSE	Status	Percentage	
A	A1	0,3	2,9
	A2	2,6	
B	B1	5,6	15,3
	B2	9,7	
C	C1	19,8	32,1
	C2	12,3	
D	D	29,7	29,7
E	E	20,0	20,0

Table 5 - Urban Peru Data

Urban + Rural Peru



Graph 10 - Distribution of socio-economic status in Urban + Rural Peru

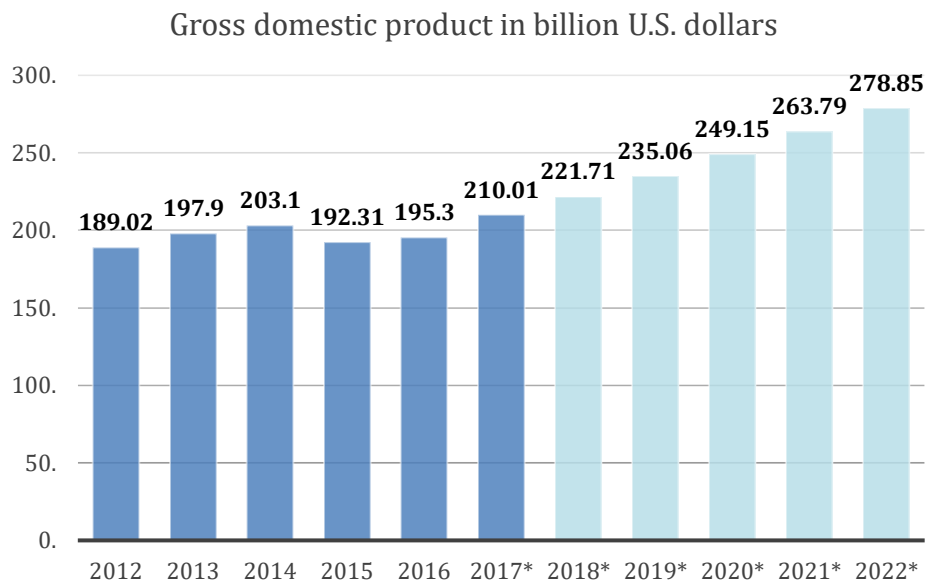
NSE	Status	Percentage	
A	A1	0,2	2,2
	A2	2,0	
B	B1	4,3	11,7
	B2	7,4	
C	C1	15,2	24,8
	C2	9,6	
D	D	24,3	24,3
E	E	37,0	37,0

Table 6 - Urban + Rural Peru Data

2.1.5. Macro-economics characteristics

In last years, peruvian economic activity has suffered a slowdown due to the moderated internal demand and basically for the contraction of private and public investments. This phenomenon has increased in the second half of 2016 due to new fiscal policies, to several corruption cases in different important industries and to the phenomenon of the Niño Costero. The situation starts to get better in second semester of 2017, and in this period the GDP grows around 2,4 percent. This is due to an improvement in agriculture and fishing activities. The minor growing of the

manufacturing is still due to the phenomenon of Niño Costero. Anyway it is registered a moderate increase in commercial and services sector. As the manufacturing sector, construction is in the same situation registering a major slowdown. After an initial slowdown in the first term of 2017, GDP starts increasing again of the 2,4 percent in following term. This is due to an increase in internal demand registering an increase of 0,4 percent. Forecast for the future are a more stable situation for the primary sectors such as agriculture and fishing and an improvement in the market job situation.



Graph 11 - GDP trend in last years

2.1.5.1. Main productive sectors

Services account for 43% of Peruvian gross domestic product, followed by manufacturing (32.3%), extractive industries (15%), and taxes (9.7%). Recent economic growth has been fueled by macroeconomic stability, improved terms of trade, and rising investment and consumption. China has become Peru's largest trading partner, following a free trade agreement with the People's Republic of China signed on April 28; along with it in 2009 additional free trade agreements have been signed both with the United States of America (2006), and the European Union (2012). Finally the EU and Peru signed a collaborative Trade Promotion Agreement with Japan on May 31, 2011.

2.1.5.1.1. Agricultural sector

Peru is a country with many climates and geographical zones that make it a very

important agricultural place. Its agricultural exports are highly appreciated and include artichokes, grapes, avocados, mangoes, peppers, sugarcane, organic coffee and premium-quality cotton.

2.1.5.1.2. Industry and services

2.1.5.1.2.1. Extraction

The main Peru extraction area is mining. In particular, Peru ranks fifth worldwide in gold production (first in Latin America), second in copper, and is among the top 5 producers of lead and zinc.

2.1.5.1.2.2. Manufacturing

Peru has developed a medium manufacturing sector. The sector now represents 23% of GDP and is strongly tied with mining, fishing, agriculture, construction and textiles. Manufacturing is mainly devoted to processing for gaining a value-added advantage. The most promising sector is textiles, metal mechanics, food industry, agricultural industry, manufactures, chemicals, pharmaceuticals, machinery and services.

2.1.5.1.2.3. Services

Tourism has represented a new growth industry in Peru since the early 1990s, with the government and private sector dedicating considerable energies to boosting the country's tourist destinations both for Peruvians and foreigners.

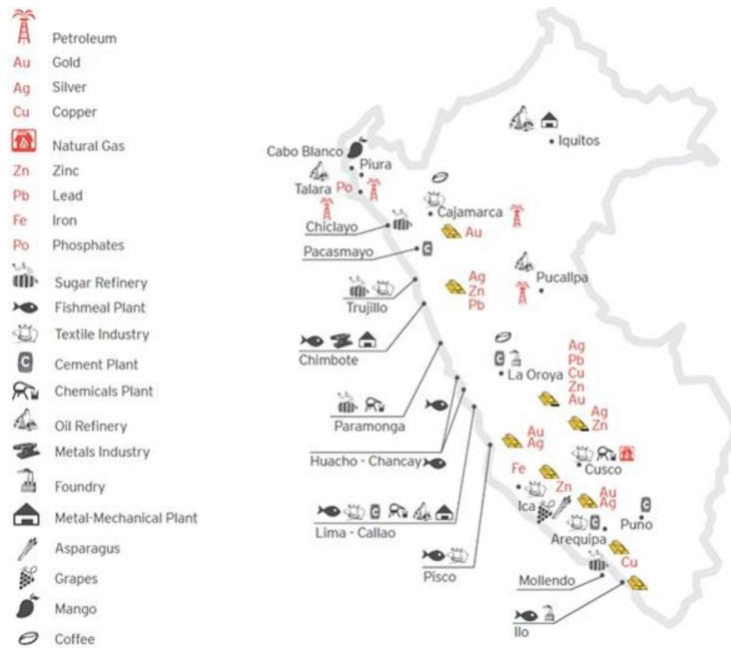
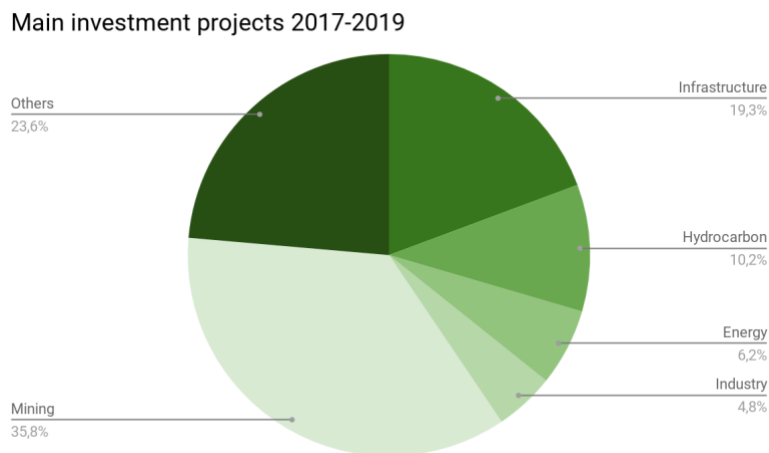


Figure 6 - Map of main production activities

2.1.5.2. Main investment sectors

A partial support of the attended growing in 2017 has been the implementation from the new government, of big energy projects, infrastructure and mines, including copper ones of Toromocho e Las Bambas. Even though local population conflicts and multinational companies which controls mines and fields (more than 150 in all peruvian territory), mine sector is growing and remains fundamental for the economy of the country. The government also propose a social policy which contributes to reduce poverty rate which for 2017 has been registered as 21,8% of population.



Graph 12 - Distribution of main sector investments

2.1.5.3. Main import - export area

Peru is the 43rd largest export economy in the world. In 2016, Peru exported \$35.6B and imported \$35.8B, resulting in a negative trade balance of \$141M. In 2016 the GDP of Peru was \$192B and its GDP per capita was \$13k.

The top exports of Peru are Copper Ore (\$8.58B), Gold (\$6.43B), Refined Petroleum (\$1.62B), Refined Copper (\$1.33B) and Zinc Ore(\$1.19B), using the 1992 revision of the HS (Harmonized System) classification. Its top imports are Refined Petroleum (\$2.31B), Cars(\$1.65B), Crude Petroleum (\$1.62B), Broadcasting Equipment (\$1.11B) and Delivery Trucks (\$842M).

The top export destinations of Peru are China(\$8.48B), the United States (\$6.24B), Switzerland (\$2.55B), Canada (\$1.68B) and South Korea (\$1.39B). The top import origins are the United States (\$7.95B), China (\$5.99B), Brazil (\$1.95B), Chile (\$1.51B) and Mexico(\$1.4B).

2.1.5.3.1. Exports

In 2016 Peru exported \$35.6B, making it the 43rd largest exporter in the world. During the last five years the exports of Peru have increased at an annualized rate of 8.33%, from \$47.2B in 2011 to \$35.6B in 2016. The most recent exports are led by Copper Ore which represent 24.1% of the total exports of Peru, followed by Gold, which account for 18.1%.

Mineral Products	Precious Metal	Animal and Vegetable Bio Product	Metals	Foodstuffs	Textiles
(\$14.7 B)	(\$6,81B)	(\$321M)	(\$2,85B)	(\$2,63B)	(\$1,22B)
Copper Ore 24%	Gold 18%	Coffee 2,1%	Refined Copper 3,7%	Animal meal and pallets 2,8%	Knit T-Shirt 0,92%
Refined Petroleum 4,5%	Silver 0,79%	Grapes 1,8%	Raw zinc 1,4%	Other processed vegetables 1,1%	
Zinc ore 3,4%		Tropical fruit 1,7%	Raw tin 0,98%		
Lead Ore 3,3%					

Table 7 – Main Peru export products

2.1.5.3.2. Imports

In 2016 Peru imported \$35.8B, making it the 47th largest importer in the world. During the last five years the imports of Peru have decreased at an annualized rate of - 5.006%, from \$38.1B in 2011 to \$35.8B in 2016. The most recent imports are led by Refined Petroleum which represent 6.47% of the total imports of Peru, followed by Cars, which account for 4.61%.

Machines (\$8,99B)	Mineral products (\$4,27B)	Transportation (\$3,9B)	Chemical products (\$3,87B)	Metals (\$2,72B)
Broadcasting equipment 3,1%	Refined petroleum	Cars 4,6%	Packaged médicaments	Coated Flat - Rolled Iron
Computers 2,3%	Crude petroleum	Delivery Trucks 2,4%	1,4%	0,69%
Telephones 1,5%			Acid, Oils and Alcohol 1%	Iron structures
Video displays 1,4%				0,64%

Table 8 – Main Peru import products

2.1.5.3.3. Trade Balance

As of 2016 Peru had a negative trade balance of \$141M in net imports. As compared to their trade balance in 1995 when they still had a negative trade balance of \$2.01B in net imports.

2.1.5.3.3.1. Destination

The top export destinations of Peru are China (\$8.48B), the United States(\$6.24B), Switzerland (\$2.55B), Canada(\$1.68B) and South Korea (\$1.39B).

Asia (\$13,2B)	North America (\$9,36B)	Europe (\$8,17B)	South America (\$4,39B)
China 24%	United States 18%	Switzerland 7,2%	Brasil 3,4%
South Korea 3,9%	Canada 4,7%	Spain 3,4%	Chile 2,8%
Japan 3,5%	Mexico 1,3%	Netherlands 2,8%	Colombia 2%
		Germany 2,5%	Bolivia 1,6%
		United Kingdom 1,6%	
		Italy 1,3%	

Table 9 – Main Peru destinations

2.1.5.3.3.2. Origins

The top import origins of Peru are the United States (\$7.95B), China (\$5.99B), Brazil (\$1.95B), Chile (\$1.51B) and Mexico(\$1.4B).

Asia (\$13,5B)	North America (\$9,95B)	South America (\$7,17B)	Europe (\$4,85B)
China 23%	United States 20%	Brazil 6%	Germany 3,1%
South Korea 3,6%	Mexico 4,7%	Colombia 3,3%	Italy 2,1%
Japan 2,9%	Canada 1,9%	Chile 3,2%	Spain 1,8%

Table 10 - Main Peru origins

As it is possible to see, Peru is strongly dependent from Europe for what concern electronic devices and machinery, while Europe is more interested in raw extracted material.

2.2. Socio economic context in Colombia

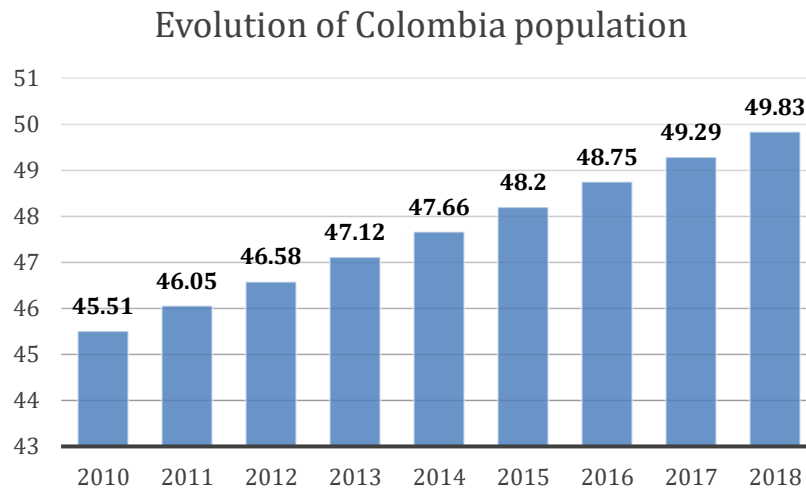
Colombia is a country situated in the north-west of South America. It is bordered in the north by Panama and Caribbean Sea, in the east by Brazil and Venezuela, in the south by Peru and Ecuador, and in the west by the Pacific Ocean. Colombia is an extremely biodiverse country extended for 1.141.748 km² and characterized by forests, jungle, deserts, peaks of the Andes mountains and the tropical Amazon Basin rainforest in the east with the Amazon river. Colombia is a presidential and constitutional republic divided in different departments. The capital of the country is Bogotá which is the most populated city. Other important urban centers are: Medellín, in the region of Antioquia, Cali in Valle del Cauca, and Barranquilla situated in the Atlantic region.

It is classified as an emerging market with a high level of human development and upper middle income level. The official spoken language is Spanish (Castellano), although there are many dialects and languages coming from Indigenas.

2.2.1. Population: composition and characteristics

Colombia used to be quite a poor country, dilanied by an internal war back in the 80's. Then a big change happened when a peace agreement was reached, and most of the rebels gave up with their intentions; from then on Colombia knew quite a surprising

economic development and started being considered a developed country. According to the national statistics institute DANE (Departamento Administrativo Nacional de Estadística), all these new characteristics have been reflecting by the population change over the years.



Graph 13 - Evolution of Colombia population

As usual for developing countries, population (currently counts 49.587941 inhabitants) has grown during the years, especially right after the agreement, with a levelling in the last years (growth rate equal to 1,27%). Nowadays Colombia represents the third-most populous country in latin America, after Mexico and Brazil.

The population is not uniformly distributed across the territory: the southern-east part is really little populated for the presence of Amazonian forest, while most of the population is concentrated along the andean areas and the Caribbean cost-regions; the four most populated regions are: Cundinamarca (around 9 millions), Antioquia (5,671 millions), Valle del Cauca (4,060 millions), Atlantico (2,112 millions); the average national density is 42,25 inhabitants/sq Km.

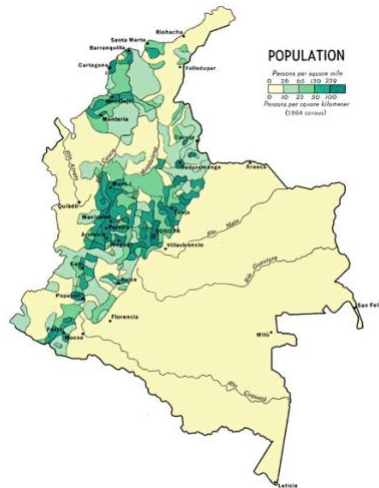


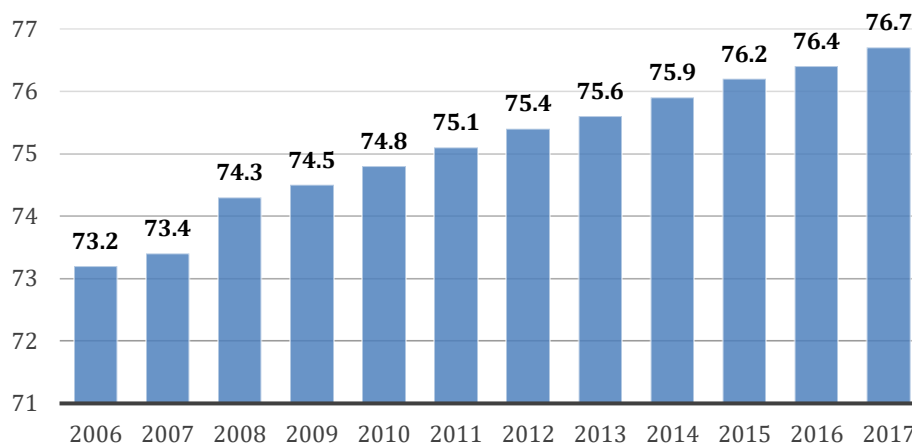
Figure 7 - Colombia population density

2.2.2. Urbanization in Colombia

DANE and the newspaper “elcolombiano” have tracked urbanization evolution in Colombia. It started nearly 50 years ago as a consequence of civil disorders for the newly formed National Front. Counting on a not controlled power, the government fostered very severe policies such as Accelerated Economic Development, which forced hundreds of thousands of people to move from their family farms. From 1960s Colombia has gone through a process of massive migration to its cities that has turned a mostly agrarian society into one of the most urbanized nations in Latin America. Bogotá, Medellín, Cali and Barranquilla got their economic activity increased, developed a better education and health-care system, and had a leading role in technological development.

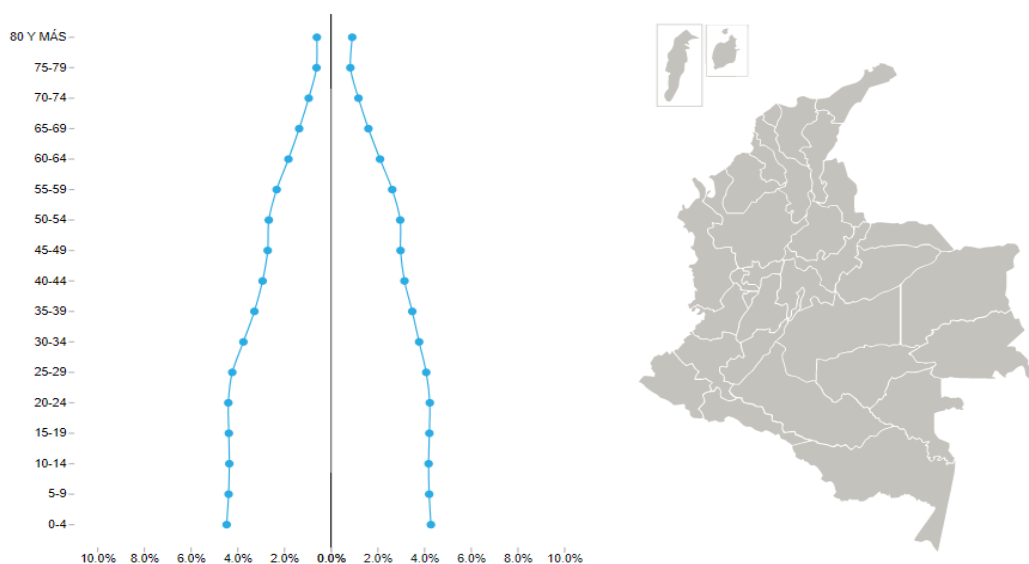
The growth made a huge number of rural inhabitants migrate to the cities. During the 2000s, Colombia's urbanization rates was one of the highest in Latin America, with the urban population increasing to 75 percent from 72 percent of the total. By the way urban areas remain Colombia's primary growth generator, and recently the country is having this process overturned, encouraging a rural revival: the above mentioned political negotiations, getting an end to half-century of violence, is giving the possibility to redistribute farmland among those displaced.

Percentage of urban population out of total population



Graph 14 - Percentage of urban population out of total population

2.2.3. Population composition



Graph 15 - Population age composition

It appears pretty clear the fact that Colombia population is getting younger as consequence of its growth. According to DANE, in 2018 the total population is 49,834 million people, 25,228 of which are female, the remaining part male.

More things characterizing Colombian population are the several ethnic groups present across the territory; in the paper “*Colombia una nación multicultural: su diversidad étnica*” is explained how there are four main groups through which people

can be classified: Indigenas, Afrocolombianos, Gitanos, and all the people not belonging to any of these groups. The presence of each of them is not homogenous all over the territory; in particular, the Afrocolombians are mainly present all along the Pacific corridor and Caribbean cost line; the group corresponding to white and not belonging to a specific group is mainly situated in the central regions (Andean areas); pretty much the same for the Gitanos. Indigenas are the native inhabitants of the country, and after the colonization they just abandoned the areas where white people decided to live. Nowadays their presence characterizes many regions, but the density is particularly high only for some of them; more in details they are distributed as following in term of numbers

Departamento	N ^a de resguardos en municipios	Municipios con resguardos	Población indígena proyectada 2011
Amazonas	29	10	27.379
Antioquia	45	21	19.238
Arauca	26	6	4.410
Boyacá	2	2	4.700
Caldas	8	5	49.031
Caquetá	45	10	7.742
Casanare	11	4	6.691
Cauca	93	26	233.135
Cesar	11	5	42.801
Chocó	119	26	54.009
Córdoba	4	4	51.859
Guainía	25	4	16.800
Guaviare	25	3	10.267
Huila	16	10	6.699
La Guajira	26	11	241.516
Magdalena	5	5	8.421
Meta	20	6	11.034
Nariño	65	20	124.841
Norte de Santander	9	6	4.865
Putumayo	66	13	26.409
Risaralda	6	3	10.506
Santander	2	2	919
Sucre	3	3	17.823
Tolima	72	7	23.635
Valle Del Cauca	26	14	9.903
Vaupés	5	4	19.533
Vichada	32	4	30.063
Total	796	234	1.064.229

Table 11 – Indigenas Population per departement

2.2.4. Poverty

For 2017, the poverty limit in Colombia was equal to \$241.673 (it considers just one dimension, the monetary one), meaning that the part of population lying up to this income value are not considered poor. According to DANE, the 28% of Colombian

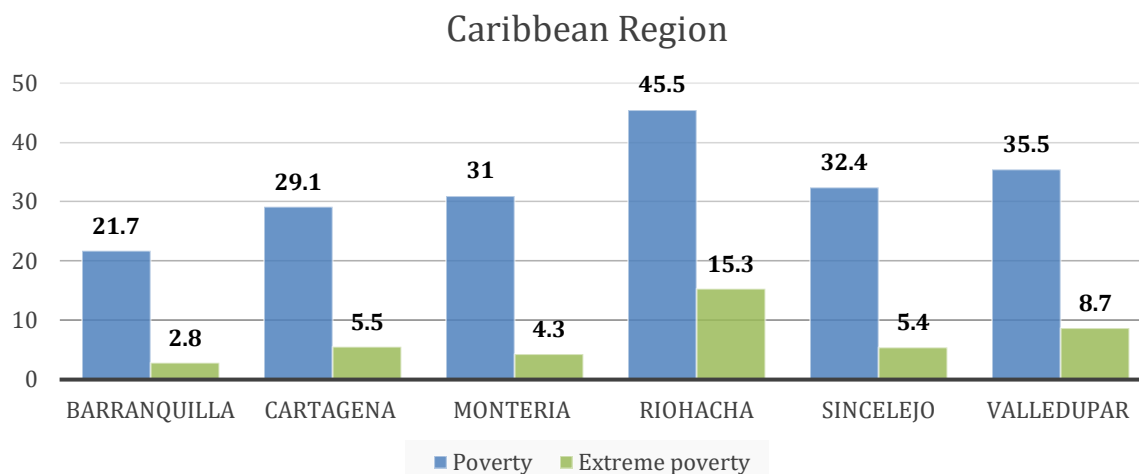
population can count on incomes lower than that value, which represents an increase of 0,72% compared to 2016.

An extreme poverty limit was set to \$114.692, which represents the minimum cost per capita for the basic food to survive. As for the 2017, the proportion of population which was down of the extremely poverty limit, or found living in a destitute situation, was the 8,5%; in the 2015 was 7,9%. In the urban areas, the incidence of extreme poverty reached a value of 5,6% of the total population, above the 4,9% of last year. In small rural towns this proportion is three times the one of urban areas: the part of population in extreme poverty condition was equal to 18,1% (DANE).

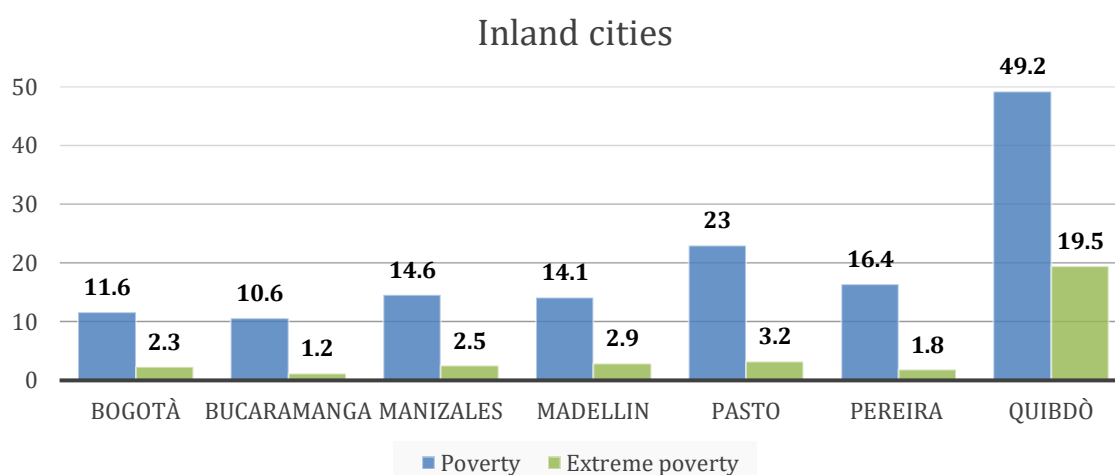
As for the Caribbean region the overview is not favourable. With the exception of Barranquilla, which passed from 22% to 21% in 2016, the situation did not show any improvements in the remaining cities. Montería, for example, disclosed an increase of 23% in poverty (31% in 2017); exactly the same happened to Cartagena, which passed from 26,2% in 2016 to 29,1% in 2016.

The situation is even worse if we compare the region with the inland cities: Bogotá, Bucaramanga, Manizales and Medellín presented poverty levels of 11,6%, 10,6%, 14,6% and 14,1%, respectively. Lower than Caribbean region, whose value was 32,5% (DANE)

Talking about extreme poverty, Montería was the most affected, with a proportion of people living in extreme poverty duplicated: it passed from 2,1% in 2016 to 4,3% in 2017. In Valledupar, this indicator passed from 4,6% in 2016 to 8,7% in 2017; Cartagena passed from 4% to 5,5%. Once again, inland cities have had a better situation: Bucaramanga was the best with 1,2%, while Pasto is the most improved (DANE).



Graph 16 - Caribbean Region poverty



Graph 17 - Inland cities poverty

When it comes to analyze multidimensional poverty that is, keeping into consideration educative conditions of the place, conditions of childhood, health, job and access to public services (as mentioned in Peru socio-economic analysis paragraph), the country had a reduction of poor population: it passed from 20,2% in 2016 to 17,8%. This kind of poverty have been three times larger in rural sectors (37,6%) than the main urban areas (12,1%).

According to Andrés Vargas, director of OCSA (Observatorio de Condiciones Socioeconómicas del Atlántico) of Uninorte, the rural population reach a lower number of education years on average, the proportion of children and teenagers with no

education is higher, the illiteracy is more frequent, a higher proportion of houses does not have directly access to the water.

2.2.4.1. Inequality

After the previous analysis and according to a report made by Banco de la Republica de Colombia, it can be said that on one side the country increases its monetary poverty, but on the other side a lower inequality was spotted during the last year: the inequality of incomes, measured by Gini coefficient, decreased, passing from 0,522 in 2016 to 0,517 in 2017.

At a regional level, Barranquilla had a Gini of 0,433 (1,3 p.p more than last year), classified as the lowest unequal in the region, while Riohacha, with a Gini of 0,520, was the most unequal in the region.

Cities like Bogotá, Manizales and Medellín, although presented a lower level of poverty, compared to the remaining cities of the region, had levels of inequality similars to Caribbean region, with 0,499 and 0,476, respectively; the lowest level was obtained with Bucaramanga 0,399 and Pereira with 0,411.

2.2.4.2. Social classes in Colombia: “estrados”

According to the paper: “Roberto Angulo, Alejandro Gaviria, Liliana Morales: *La década ganada: evolución de la clase media, la pobreza y la vulnerabilidad en Colombia*” the actual economic and socio-political conformation of the country is the result of the historic process which has like antecedent the Aboriginal society and the European conquest of America, from when three types of society got formed as a consequence: colonial, semi-feudal, commercial and slavery; finally the english-semi-colonial society which determines underdevelopment and dependence towards foreign countries.

The bad use of existing human and geophysical resources, disadvantageous and unfair market exchange, the awful distribution of richness and incomes, agriculture crisis, the high rate of concentration of rural and urban lands ownership and capital, insufficiency of infrastructure, the fast and uncontrolled urbanization and the not official civil war aggravate more and more in the last decade with the absurd and unilateral

application of globalization and neoliberalism, established in the agreement of Washington in 1990.

This is the historical background from where Colombian social classes originated; in particular, they go from one to six, from the poorest to the richest respectively. Here following a classification will be made considering not only the economical factor (data taken from Roberto Angulo, Alejandro Gaviria, Liliana Morales: *La década ganada: evolución de la clase media, la pobreza y la vulnerabilidad en Colombia*).

Socio-Economic status	Average family income	Employment	Feed	Good, services and education	Houses
Estrado 1	22.260.000 people. Till \$463.500 of monthly income per family, 1.5 the minimum salary. Up to \$77.250 of income per capita. They cannot satisfy their basics necessity.	Unemployed or semi-unemployed, salaryless small farmer, beggar, freights,, small shoppers and artesans, street vendors, offices employers, victims of violence and migrants, campesinos and criminals No less than 80% of the population of this class lack of a regular and permanent job	This is the class where most of desnutricion indicators are concentrated: insufficient consumption of milk, meat, eggs, vegetables and fruits.	They lack of medicine and medical attendance. No less than 25% is illiterate, while five millions children between 4 and 14 years do not attend school regularly.	Most of the houses of this social class lack of public service: potable water, electricity, phones, sewage systems. The absolut habitable deficit is equal to three million houses. Most of its members live in farms, hovels or shared house
Estrado 2	1.470.000 families composed of 6 members each. From \$460.501 to \$927.000 of monthly income per family. From \$77.250,16 to \$154.500 of incomes per capita.	Modest autonomous workers, day laborers, mini-funders, vigilantes, domestic employers, garage workers, store employers, small artesans, drivers, waiters, police men and professionals militaries	They consume an insufficient food quantity and variety	Their children are educated in the public schools and most of them lack of regular medical attendance.	They live on rent in popular houses in the cities, or in modest houses of small town of rural areas.
Estrado 3	They represent the 2.5 % of the total population. 1.050.000 people.	It is characterized by owners of small and modern fincas well situated, dedicated	They are not rich but can afford to go to the restaurant	They have their own family vehicle, educate their children in	They own their own house, many times in good

	<p>They can count on a monthly income from \$3.090.001 to 6.798.000 per family.</p> <p>That means from \$772.500,25 up to \$1.699.500 of per capita income.</p>	<p>dedicated to the technical and commercial production of agricultural products of high demand; small industry owners, renters and professionals, medium business men, public workers of some categories.</p>	<p>once in a while; they are able to guarantee a good food level to their families</p>	<p>some prestigious and good level schools and count on pre-paid health services.</p>	<p>neighbourhoods</p>
Estrado 4	<p>They represent the one per cent of the total population: 420.000 people. Their monthly income per family goes from \$12.360.001 to \$21.630.000</p>	<p>They are owners of prosper fincas, building properties, financial businesses, elegant restaurants. They are medium shareholders of various kind of companies. high policy and military officers, members of parliament and high court justice court.</p>	<p>They can afford any kind of food expenses for the family and guarantee good restaurants.</p>	<p>They own more than one vehicle for their family, educate their sons in prestigious universities. They travel abroad quite frequently and are part of quite prestigious social clubs.</p>	<p>They live in exclusive neighbourhoods and own quite luxurious apartments.</p>
Estrado 5	<p>It represents the 0,199 of the population, with 83.580 people. They have a monthly income which goes from \$ 60.255.001 to \$129.780.000.</p>	<p>Big land property owners across Llanos Orientales, Magdalena Medio and the Costa Atlántica; main shareholders of emerald mines, palm's plantacion, big industrial enterprises, warehouse and supermarket chains; entrepreneurs of transports, of banks and financial corporations; owners of media of all types, universities and clinics.</p>	<p>They can afford going often to high quality restaurants and a high quality of food for their family</p>	<p>They are part of the big social clubs and offer big receptions several time per year. They educate their sons in very renomate foreigner universities. They have a vehicle for each member of the family.</p>	<p>They live in luxury mansions, they always travel abroad, where they have properties in the main financial cities and cost places</p>

Estrado 6	105 families of 4 members each. 420 people in total in the whole country. From \$ 129.78.001 on, with an average per month of 350 million per family. More than 420 times the minimum salary with an average of 1.132,68.	As part of this group we can find owners of the biggest industrial groups, constituted by the biggest mining, food, manufacturing, commercial, financial, oil, editorial, communication and transport companies; they also run several activities and investments abroad	They have so much money they can buy the whole supermarket	Their children are educated in the best schools and universities all around the world. They can count on the best private medical assistance of the country (even if they often live abroad)	They have mansions in several exclusive places in the world, got private jets and are part of Jet Set internacional. Most of them live abroad.
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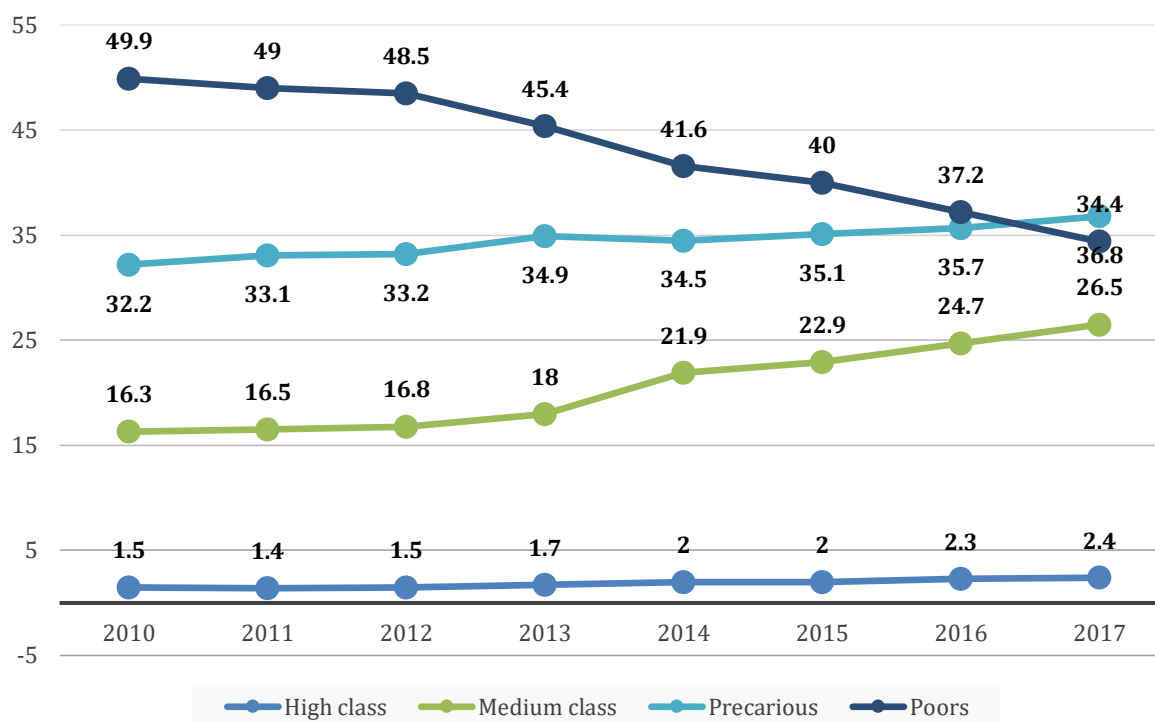
Table 12 - Colombia socio economic status description

2.2.5. Evolution of Colombian social classes over time

In certain respects, the growth in Colombia's middle class has been even more dramatic than the regional average. World Bank figures show that between 2001 and 2014 the share of the population living in poverty more than halved, from 60% to 29%. At the same time, the middle class more than doubled, increasing as a share of the population from 11.3% to 29.6%.

Indeed, 2014 was the first year when the middle class population was greater than those in poverty, whereas those in poverty had outnumbered the middle class by a factor of more than five at the turn of the century. Still, 38.7% of the population, the largest segment, was classified as vulnerable in 2014. Colombia has a stark urban-rural division. The middle class accounted for 35% of the urban population in 2014, but only 11% of their rural counterparts. Meanwhile, the poverty rate had fallen to 22% in urban areas, but still stood at 53% in rural areas.

Social classes evolution over time



Graph 18 - Social classes evolution over time

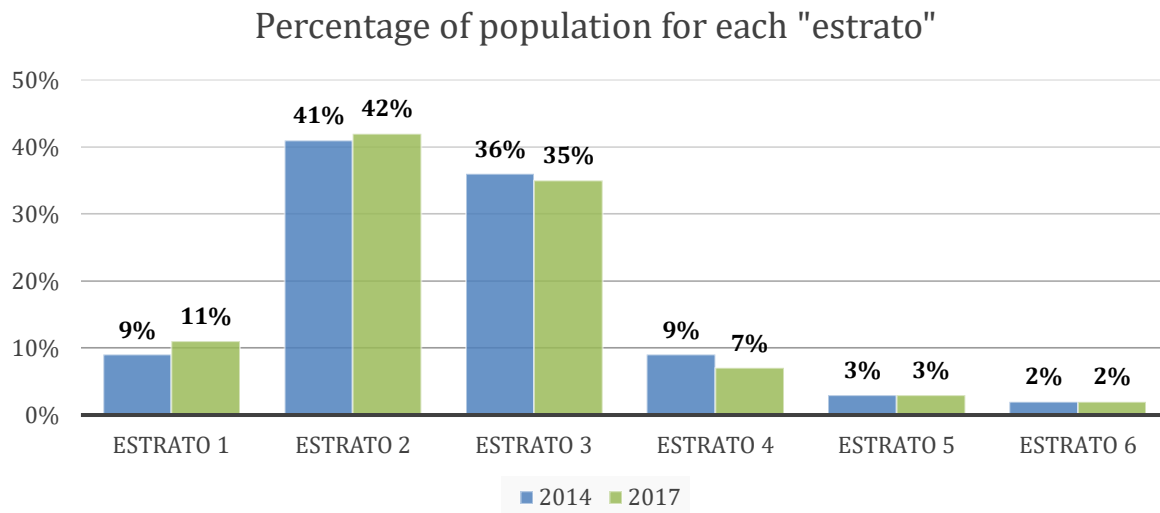
The national concept of middle class varies according to social and economical conditions and parameters of each country. The mentioned study about social mobility included people with a monthly income of up to 5.500 dollars as belonging to the new colombian middle class.

The incomes parameters of the middle class adopted by the Banco Mundial still include way poorer salaries, which oscillate between 10 and 50 daily dollars per inhabitant, that is employees gaining between 300 and 1.500 dollars per month.

Keeping into account the minimum salary in Colombia was set at 380 dollars monthly, the differences within the middle class are large and evident. This is clearer when 4 people families have to survive with such an amount of money. As a result, people commonly talk about low and up middle class.

According to “Finanzas Personales: Clase media en Colombia: frágil, pero en crecimiento” no doubt a fragile middle class is the result of a fragile economy, mainly based on the extraction of minerals and other raw materials. It has been previously

mentioned that middle class more than doubled, but most of these ex poor people passed from estrato 1 to estrato 2 and 3, which means their salary is still quite low. This is due to the fact that inequality is a big problem in Colombia: in fact, 1% of the population is able to gather 20% from the total in-flow of the country, avoiding a wider spread of the richness and an enlargement of middle class. This was a picture of the development between 2014 and 2017.



Graph 19 - Percentage of population for each "estrato"

2.2.5.1. Economic view

Following a country report made by Worldbank, since 2014 Colombia has gone through several hard events to be faced, different in terms of importance and magnitude, on both internal and external fronts. Fortunately, Colombia has been one of the best at responding among the countries of the area; this was thanks to appropriate economic policy responses, both monetary and fiscal, the robustness of the financial system and the presence of other stabilization mechanisms of the economy such as the flexibility of the exchange rate.

There have been three external shocks: the first, and perhaps the one with the most important impact for its magnitude and durable nature, has been the fall of the international prices of the main commodities exported by Colombia since mid 2014, particularly oil, negatively affecting the trades. It must be noted that oil prices stay low, which means a permanent change in the structure of the economy. The second has

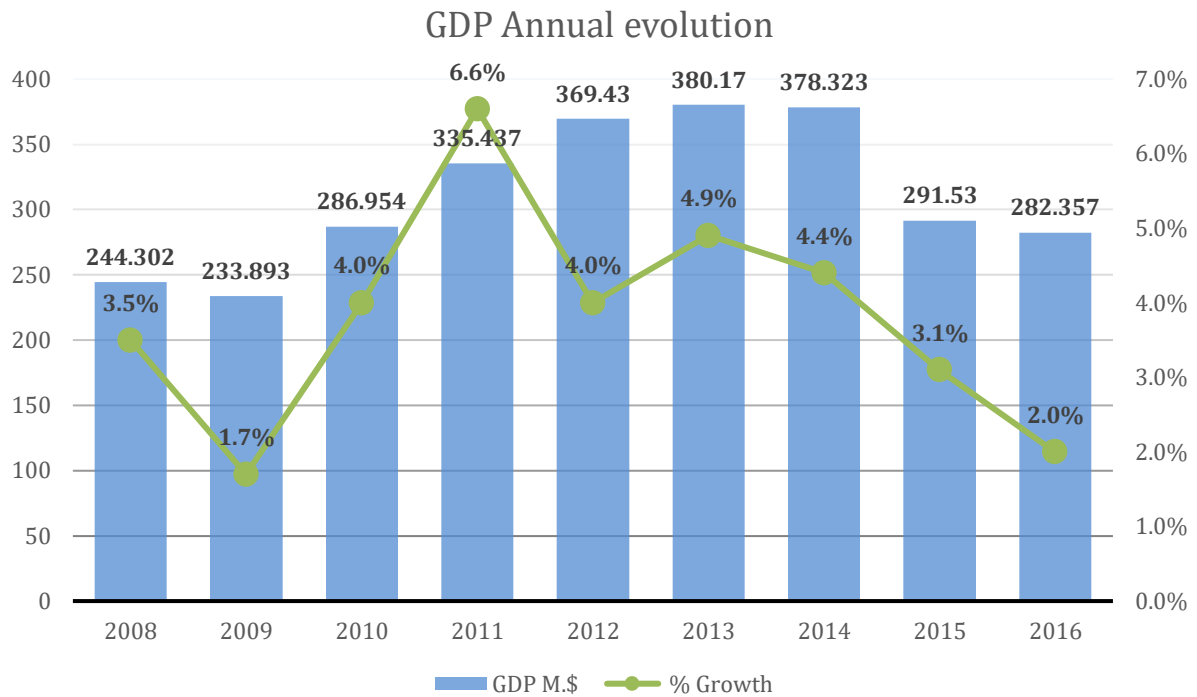
been the economic problems faced by the country's major trade partners. The third one is related to an increase of external financial costs due to the rise of risk rate for the country and the depreciation of the currency, which was given as a consequence of the two previous events.

A part from these extreme events, others from within took place at the end of 2015 and in 2016. These domestic shocks, despite totally random in nature, deteriorate the country's main macroeconomic variables: in the first place, the climatic effect of El Niño phenomenon observed since mid 2015 and, at second, the trucking strike, which influenced a big part of the country in June and July of 2016.

The combined effect of these events led to the emergence of macroeconomic imbalances to which the economy has had to adjust. The oil shock implied a significant deterioration in the country's terms of trade, leading to a widening of the current account imbalance and, at the same time, to deterioration of public finances, given the strong dependence of the country on oil revenues. The lower income from exports, along with increases in the country's risk premia, generated a significant depreciation of the peso, which, together with domestic supply shocks and the activation of indexation mechanisms, led to an increase in inflation, causing it to post outside the target range set by the Central Bank (between 2.0% and 4.0%).

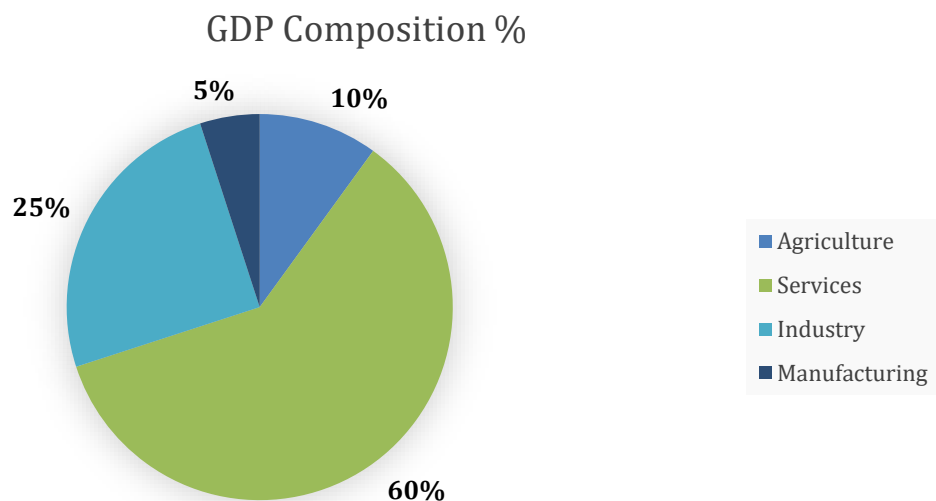
The deterioration of national income and the adjustments to government spending led to a weakening of domestic demand, which, linked to a fragile external demand, explains the slowdown of economic growth in the past two years. Thus, the high levels of inflation were accompanied by a significant slowdown in growth.

The GDP of Colombia during the third trimester of 2017 increased of 0,8% compared to the previous. Yearly GDP variation was 2%, 0,8 more than the one of second trimester of 2017, which was 1,2%. The amount of GDP in the third trimester of 2017 was 65.738 millions of euros, when Colombia had a GDP Per capita trimestral of 1.351€ euros, -12 euros less than the previous trimester. In general, the graph 20 represents the evolution over the years (CountryEconomies.com: GDP in Colombia).



Graph 20 - GDP annual evolution

2.2.6. Main industrial sectors in Colombia



Graph 21 - GDP sectors composition

As can be seen from the above reported graph services constitute the most important sector in term of contribution to the GDP (<https://www.oecd.org/gov/gov-at-a-glance-2017-colombia.pdf>). By the way Colombia is a developing country, meaning those percentages are changing year by year. Along with the improvement of the economy Colombia is gaining the international market trust and more favourable relationship

with some of the most important actors of the market worldwide. Among Colombia main trade partners there are United States, China and Mexico.

2.2.6.1. Services

As previously mentioned, tertiary sector in Colombia is one of the most developed. According to the DANE, the tertiary sector employ more than 80% of country labour force.

In economy, this sector is the one that is in charge of the activities of commerce, services and transport, so offering and distributing products. Tourism deserves a special mention as it is growing constantly in the last years, in particular of a 9% between 2003 and 2013.

2.2.6.2. Agriculture

Agriculture is for sure one of the sectors taking advantage from the peace agreement with Farc and other revolutionary groups. Wide and unused territories have had being used producing way more than the past. Among the most important products commercialized figure Coffee and Tropical fruits, such as bananas and platanos, and potatos.

2.2.6.3. Manufacturing

Thanks to trade agreements and a strategic geographical location, the country has become an important point of production and distribution of products. This big development of the sector is also due to competitive costs, an attractive domestic market, skilled labor and a high quality in production processes, conditions that ensure world-class products, characterized by innovation and adaptability to the demands of the international market. Among the most important sectors there are textile, chemical, metallurgy, food and drink.

2.2.6.4. Industry

This area deserves a mention for the mining sector specifically: for instance, Colombia represents the largest coal mine in Latin America. The main mining resources of Colombia can be divided into two groups:

- Mainly for export: Emeralds, platinum, silver and gold.

- Mainly destined to the domestic market of the country: Cement, coal, clay, salt, sand, gravel and silica.

Most of the mining resources are found in the west and northwest of the country, in the Andean regions and Coastal from Colombia.

2.2.6.5. Colombia imports and exports

By means of Atlas association an analysis about imports and exports of the country was performed. Colombia is the 45th largest export economy in the world. In 2016, Colombia exported \$30.2B and imported \$42.9B, resulting in a negative trade balance of \$12.6B. In 2016 the GDP of Colombia was \$282B and its GDP per capita was \$14.2k.

The top exports of Colombia are Crude Petroleum (\$7,87B), Coal Briquettes (\$4,39B), Coffee(\$2,45B), Refined petroleum (\$1,96B) and Cut Flowers (\$1,31B), using the 1992 revision of the HS (harmonized system) classification. Its top imports are Refined petroleum (\$3,51B), Cars (\$1,84B), Packed medicaments (\$1,33B), Broadcasting equipment (\$1,23B) and computers (\$1,11B)

The top export destinations of Colombia are the United States(\$10.2B), Panama (\$1.91B), the Netherlands (\$1.21B), Ecuador (\$1.2B) and Spain(\$1.16B). The top import origins are the United States(\$13.1B), China (\$6.75B), Mexico (\$3.07B), Brazil(\$2.23B) and Germany (\$1.65B).

Colombia borders Panama, Brazil, Ecuador, Peru and Venezuela by land and Costa Rica, the Cayman Islands, the Dominican Republic, Honduras, Haiti, Jamaica and Nicaragua by sea.

2.2.6.5.1. Exports

In 2016 Colombia exported \$30.2B, making it the 45th largest exporter in the world. During the last five years the exports of Colombia have decreased at an annualized rate of -13.551%, from \$61.1B in 2011 to \$30.2B in 2016. The most recent exports are led by Crude Petroleum which represent 26% of the total exports of Colombia, followed by Coal Briquettes, which account for 14.5%.

Mineral products (\$14,6B)	Vegetal product (\$4,9B)	Precious metals (\$1,4B)
Crude petroleum (26%)	Coffee (8,1%)	Gold (3,9%)
Coal briquettes (15%)	Cut flowers (4,3%)	Precious stones (0,48%)
Refined petroleum (6,5%)	Bananas (3%)	Platinum (0,06%)

Table 13 - Main Colombia Export products

2.2.6.5.2. Imports

In 2016 Colombia imported \$42.9B, making it the 45th largest importer in the world. During the last five years the imports of Colombia have decreased at an annualized rate of -17.373%, from \$53.5B in 2011 to \$42.9B in 2016. The most recent imports are led by Refined Petroleum which represent 8.19% of the total imports of Colombia, followed by Cars, which account for 4.29%.

Machines (\$9,58B)	Chemical products (\$7B)	Cars (\$1,84B)	Refined petroleum (\$3,51B)
Broadcasting equipments (2,9%)	Packaged medicaments (3,1%)	Cars 4,3%	Refined petroleum (8,2%)
Computers (2,6%)	Human or animal blood (1,4%)		
Telephones (1,3%)	Pesticides (0,69%)		

Table 14 - Main Colombia Import products

2.2.6.5.3. Trade Balance

As of 2016 Colombia had a negative trade balance of \$12.6B. in net imports. As compared to their trade balance in 1995 when they still had a negative trade balance of \$2.97B in net imports.

2.2.6.5.3.1. Destination

The top export destinations of Colombia are United States (\$10.2B), Panama (\$1.91B), the Netherlands (\$1.21B), Ecuador (\$1.68B) and Spain (\$1.16B).

North America (\$13.047B)	Europe (\$3.328B)	South America (\$3.245B)	Asia (\$2.319B)
United States 34%	Netherlands 4%	Ecuador 7,2%	China 3,7%
Panama 6,3%	Spain 3,8%	Perù 3,4%	Turkey 2,5%
Mexico 3,1%	UK 1,6%	Brazil 2,8%	Japan 1,4%
	Germany 1,6%		

Table 15 – Main Colombia destinations

2.2.6.5.3.2. Origins

The top import origins of Colombia are the United States (\$13.1B), China (\$6,75B), Mexico (\$3.07B), Brazil (\$2.23B) and Germany (\$1.65B).

North America (\$16.17B)	Asia (\$11.58B)	Europe (\$4.21B)	South America (\$3.646B)
United States 28%	China 20%	Germany 4%	Brazil 3,1%
Mexico 8%	Japan 4,7%	Spain 2,1%	Ecuador 2,1%
Canada 1,8%	India 1,9%	France 1,9%	Chile 1,9%
	South Korea 2.1%	Italy 1,8%	

Table 16 – Main Colombia origins

As it is possible to see, Colombia is strongly dependent from United States for what concern electronic devices and machinery in import, while North America in general and Asia are more interested in raw extracted material for export.

2.3. Conclusions

From the previous analysis there are some points which have to be highlighted. It is widely known that European and Latin America countries have totally different economies, socio-economic situations and cultures.

Following are reported the main differences observed in the socio-economic analysis of both countries, taking also into consideration how circular economy would potentially take form on both sides.

1. In Europe, as almost all sectors are saturated, the circular economy model is an opportunity to be more sustainable using resources in a better way and generate new job opportunities. One of the main problem of Europe is the scarcity of raw materials and circular economy would help in reaching the goal of decreasing their excessive usage. To the other side in Latin America natural resource are abundant and almost

all the economies are based on it. This is not sustainable for two reasons: the bad exploitation of the resources is not affordable and sustainable in the long term and an inappropriate use of them is damaging for population.

2. In Europe, where countries are highly developed, it is feasible to implement circular economy at all stages of the value chain and possible to collect and have access to a wider type of data. In south America, recycling, remanufacturing or demanufacturing are concept not well developed at the moment. For local characteristics, extraction and production are simpler to be implemented and it is easier to see tangible improvements.

3. From a social point of view, Europe have a higher degree of education and awareness about environmental problems. To the other hand in South America environmental problems are considered of “second level” if we compare it with issues such as corruption and poverty. Specifically, poverty and socioeconomic status is a big challenge for such countries where the majority of population have not an adequate level of income.

4. Latin American countries are by far less densely populated than European ones, as their geography includes large deserts, mountain ranges and tropical forests, and they developed through a much shorter agricultural history than Europe. As a consequence, final energy use per capita is significantly lower in Latin American countries: European population, on average, uses more than twice the energy per capita as Chile, which has the highest energy use per capita among the countries.

Considering all these differences, it comes out the main point of the thesis project: “How European companies can develop innovative and sustainable business based on circular economy principles in Latin America?”.

To this extent, the following part of the report will be an evaluation system thought as a tool for European companies: it will comprehend a qualitative and a quantitative part, providing a full strategic picture of the situation.

3. Evaluation system

3.1. Quantitative evaluation system

As mentioned in the previous paragraph, basing on the considerations made during the literature review and the socio economic analysis of the two countries, the aim of this paragraph is to provide a framework which can be used both by European companies and Latin America countries. This evaluation system is a combination of a quantitative and qualitative analysis of practical existing cases.

From European companies point of view, this system helps understanding the actual development state of the circular economy, with a measurement system based on specific KPIs and able to make an estimation of the actual and potential level of improvement of circular economy in the countries considered for the analysis. More than that, it is necessary to have an overview of the several existing practical cases in order to understand which sectors have been explored and what are the potential opportunities.

To the other hand, for what concern Latin American countries, the evaluation system and in particular the numbers provided by the quantitative part might be a strategic decisional instrument: when governments have to deal with making a choice among different potential investors of the same sector interested in the country, along with possible economic benefits, evaluating social and environmental factors might be strategic and long-term effective for the development and health of the country.

3.1.1. Evaluation system characteristics

In order to develop an evaluation system regarding the development state of circular economy in Peru and Colombia it is necessary to consider a series of contextualized and framed indicators. Starting from the ones about raw materials, consumption, production and waste material management, it is possible to identify a system of relevant KPIs which are useful to interpreting the different circular economy processes and focusing on the interrelation between production and consumption.

The indicators have been selected also taking into consideration official sources such as INEI, APEIM, Banco central for Peru, DANE, Banco de la República de Colombia for Colombia, and secondary sources of interest. Being Peru and Colombia emerging

countries, not all data are available, especially for what concern design and consumption.

Unfortunately, it does not exist a standard or a sufficiently elaborated methodology adaptable to all possible cases. What might be done in order to understand the degree of development of circular economy in those emerging countries, is implementing an integrated evaluation system able to perform a material flow-based efficiency analysis, always depending on the needed data availability.

Anyway, it is important to develop an integrated evaluation system which results in an overview of the circular economy principles implemented, the economic transformation and the dynamic processes of social changes, which all contribute for a sustainable development.

3.1.1.1. Indicators analysis

This paragraph aims to clarify which are the main indicators chosen for the circular economy developing grade measurement and evaluation. First of all, existing indicators systems are taken into consideration, especially the ones used in Europe for measuring sustainability, social impact and green practices. As second, other basic indicators for development of eco-efficiency and sustainable use of resources are presented. In particular, in the next paragraph these basic indicators will be reported.

3.1.1.2. Existing indicators overview

In order to understand the actual situation, the starting point is the study of what have been implemented in Europe and in South America.

The European commission adopted an ambitious new measurement system for circular economy in order to measure the correct use of raw materials, adjusting the old consumption model and reverting it in a circular metabolism, so creating close loops. Therefore, there are several institutions and initiatives in Latin America in order to create consciousness about circular economy principles. The most important ones are:

- **Plataforma de la economía circular:** they are involved in the organization of conferences and events in order to present the main principles and different existing projects implemented in Latin America countries. Their purpose is to share the know-how collected from different existing projects.

- **MBDC:** they assess products and materials for any company size, from Fortune 100 to start-ups. They are the creators of the Cradle-to-Cradle Design Framework and Cradle to Cradle Certified Products Program. In addition, they have different projects in Latin America (especially Colombia), mainly related to a better usage of water.
- **Americas Sustainable Development Foundation (ASDF):** they are a venezuelan not-for-profit advisory foundation that connects people with innovative ideas to take concerted actions for the purpose of addressing sustainable development challenges across the Americas. They have a circular economy program which consists of a series of conferences.
- **IDEA Circular:** they are a brazilian company founded by two business women. They sell products made with recycled material and produced in a sustainable way. At the same time, they act as a consultant for other industries to implement sustainable practices.
- **Circular Economy Club:** The club exists to connect professionals and spur collaboration around the circular economy in order to accelerate the practicalities of embedding circularity. They are a UK foundations which acts basically all around the world, financing different projects.
- **The Circular:** it is an initiative of the World Economic Forum and the Forum of Young Global Leaders, run in collaboration with Accenture Strategy, constituting the world's premier circular economy award program. The award offers recognition to individuals and organizations across the globe that are making notable contributions to the circular economy in the private sector, public sector and society.
- **Looped Cycle Production in the Americas (CLCPA):** it is a program is an initiative of the Department of Sustainable Development (DSD) of the Executive Secretariat for Integral Development of the Organization of American States (OAS). It is focused on increasing awareness in participating countries about the relevance and viability of innovative CLCP design and manufacturing methods as means for implementing eco-intelligent and sustainable practices in companies and communities.

Hereafter is presented a scheme of a set of indicators regarding different circular economy areas taken under consideration. Starting from official sources such as

EUROSTAT and the official statistical institution of Peru and Colombia, the table below helps in understanding the reasoning behind the choice of indicators. Considering that the evaluation system should be an instrument for european companies and latin american governments, the indicators have to be adjusted considering also the objectives of local communities (Millennial objectives mentioned in socio economic analysis).

Organization	Area	Indicators
INEI and DANE	Water	Volume of water registered and distributed to users
		Volume of water used by irrigation technique
	Environmental protection	Industry spending on environmental protection
		Waste generated by sectors: industry, construction, services
		Collection of urban wastes
	Environmental statistics	Emission of greenhouse gases
		Environmental taxes: energy, transport, pollution and resources.
		National material consumption
		National extraction
		Import – Export
Agricultural ministry	Air	NO2 concentration
		PM10 concentration
		PM2,5 concentration
		O3 concentration
	Atmosphere	Gases emissions
		Emissions of acidifying gases, eutrophizing, precursors of ozone.
		Particular emissions
		Carbon print emissions
	Water	Water consumption
		Water contamination (rivers)
Quality of water		

	Soil	Occupied surface for agricultural activities
	Green Economy	National material consumption
		Number of renewable energies patents
		Environmental taxes
	Wastes	Local waste management
		Local waste treatment
		Recycling and valorization
European Environmental agency	Atmosphere contamination	Exposure of ecosystems to acidification, eutrophication and ozone
		Persistent emissions of organic pollutants
		Emissions of heavy metals
		Emissions of pollutants by sectors: transport, domestic sector, agriculture.
	Climate change	Production and consumption of substances harmful to the ozone layer
		Total emissions of greenhouse gases
		Economic losses due to extreme climatic events caused by climate change
		Atmospheric concentration of greenhouse gases
		Progress towards meeting carbon emission targets
	Soil	Humidity of floor
		Progress in the management of contaminated areas
		Erosion of the soil
Organic carbon in the soil		
	Waste management	Waste generation
Water	Use of freshwater resources	
	Hazardous substances in marine organisms	
	Urban wastewater treatment	

	Water temperature
	Water quality

Table 17 - Existing set of indicators for organization

Additionally, an approach of special interest for the Circular Economy is defined by the United Nations Organization (UN) through its Environment Program (UNEP), within the Green Economy Initiative. Regarding this, the Green Economy Progress Index (GEP) is remarkable to facilitate the evaluation of national and international policies with the aim of achieving a positive transition towards the Green Economy. The GEP Index is completed with a dashboard of eleven individual indicators that capture important issues to achieve an inclusive transition to the green economy, covering economic opportunities, social inclusion and inequality, and protecting the environment.

Among them, and for their relevance in relation to the subject that concerns this report, they stand out:

- Climate change emissions (carbon emissions, (t/year), renewable energy (part of the source of food) (%), energy consumption per capita (Kcal / person).
- Management of ecosystems (forest area (ha)); water stress (%); terrestrial and marine conservation area (ha).
- Efficiency of resources (Energy productivity (Kcal / €), material productivity (ton / €), water productivity (m³ / €), CO₂ productivity (t / €).
- Waste and chemical management (waste collection (%), waste recycling and reuse (%), waste generation (ton / year) or landfill area (ha).

It is possible to affirm that there are many concepts and indicators regarding an efficient use of raw material and waste management, being two of the most important concept of circular economy. To the other side, indicators regarding the first part of the value chain (design and systems implementation) are less abundant and, in particular, considering the reference context of Latin America, there is a significant scarcity of data and a lack of precise legislation.

3.1.1.3 Material Flow analysis

The evaluation of the state of progress of circular economy, including how to choose the correct indicators, require specific analytic tools such as the material flow analysis

(MFA). The MFA approach links economical processes with the analysis of material used and consumed.

The MFA includes different phases: extraction, eco-design, production, consumption, recycling. In this way, it follows the physical flow of natural resources through all production phases. The accounts of material flows looking at INEI and DANE, show material input in the economic system either as natural resources or coming from other economies and the respective outcomes. The quantity is usually expressed in tons which describes the extraction, transformation, consumption and final wastes.

The main objective for considering the material flows throughout the economic system is to provide basic information on the composition and changes in the physical structure of socioeconomic systems. In turn, the MFA represents a useful framework for analyzing the relationship between the economic system and the environment, and obtaining aggregate indicators of material usage and material productivity, which represents the structural basis of the measurement and evaluation of Circular Economy processes.

Figure 8 offers a brief overview of the processes of input and output of material flows, represented in operational flow accounting schemes. This disposition allows both to identify the main indicators of economic metabolism, efficiency, and productivity of resources, and to contextualize them within the analysis.

The calculations of these indicators, as well as their interrelation in systems, are based on the first law of the thermodynamics. This law implies that matter is not created or destroyed, but is transformed. Using the mass balances, it is possible to calculate the passage of materials through the system, so that the materials that accumulate in it are the difference between input and output.

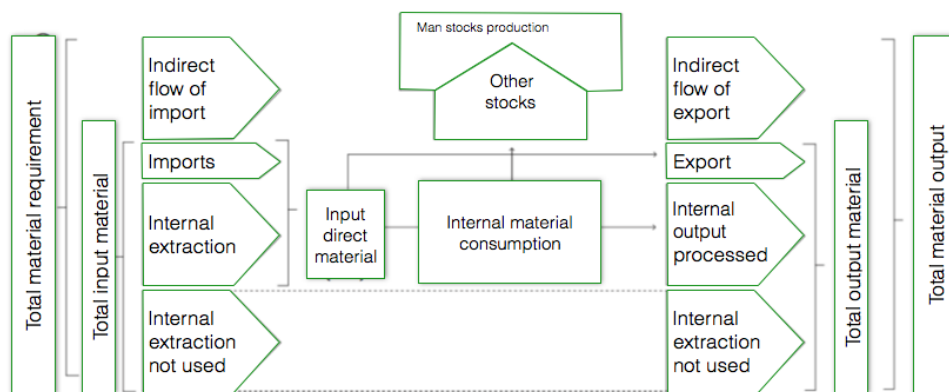


Figure 8 - Material flow stages

Based on the graph above, the main indicators of inflow, consumption and outflows, as well as efficiency and productivity of the use of resources, are presented below. The sources of information are: elaboration of ASYPS starting from Carpintero et al (2015); European Commission (2001, 2002 y 2003); Environmental European Agency (2016a y 2016b); Eurostat (2009; 2012a y 2012b) and OCDE (2000 y 20008). In the same way, the definition and formulation of each one of the contemplated indicators is detailed.

Consumption and extraction indicators	National extraction	It measures the flow of materials that are extracted from the territory and that physically enter the economic system for subsequent transformation or direct consumption (they are "used" by the economy and usually have a monetary value)
	National input material	It includes the set of materials used that become part of the economic system (from the territory itself or from abroad), it means all the materials that have monetary value and are used in the production and consumption activities

National extraction not utilized	It is about the materials that are extracted inside a territory but that do not enter to form part of the economic system (they do not have economic valuation). It is a concept very similar to that of "hidden flow", which was coined before the Guide elaborated by Eurostat (2001).
Indirect flow of input/export	They could be defined as "hidden" flows of foreign trade, that is, the amount of energy and materials that the traded goods incorporate. They are called indirect because their calculation requires the intermediate step of finding for each product -imported or exported- an internal Raw Material Equivalent.
Total material required	It includes both the materials that become part of the economic system for its use, and that part of the extraction and the unused or valued imports.
National consumption	They are the total associated materials in the domestic extraction and direct consumption activities by an economy (excluding indirect flows). This is what is usually called «Apparent Consumption» in economic terms.
Total material consumption	They are the total materials associated in domestic extraction and consumption activities by an economy. In this sense, besides the direct flows, the extraction flows not used and the

		indirect flows associated with foreign trade are included.
Outflows indicators	National processed output	It measures the total weight of extracted materials used from the domestic environment or imported, and that after being used by the economic system are returned to nature
	Total national output	Add to the above, the internal extraction not used.

Table 18 - Existing set of indicators for consumption

It is important to highlight that several of these indicators are already implemented in the environmental assessment systems applied by Eurostat, which allows a certain systematization, as well as having reliability and comparability guarantees at European level, in order to lay solid foundations for the construction of a system of circular economy indicators.

3.1.1.4. Proposed indicators

Therefore, considering as starting point to decouple the value chain the MFA, the idea is to divide the indicators in five macro areas: extraction, eco-design, production, consumption, recycling and waste management. Even if the eco-design is the second step in the value chain, as the information available are not enough, it is considered at the end.

Doing so, the proposed approach, in addition to the main indicators which mark the trend in productivity and efficiency in the central axis of resources-waste, intends to have a table of indicators adjusted to the phases of the circulation (inputs of materials, ecodesign, use of materials in production, use of materials in consumption, recycling of waste) that offer relevant information about the capacity of the economic model to "close circles" and that are especially useful to track progress.

More in detail, for each macro area, in the following table is reported a logical question to understand the degree of implementation, a possible indicator for the measurement,

the unit of measure and the data availability (the sources are the same mentioned before).

Area	Logical question	Possible indicator	Unit	Data availability
Extraction	Are the extraction of raw material decreasing in Peru and Colombia?	Quantity of extracted raw material	tn	++
	Are wasted raw materials decreasing in Peru and Colombia?	Quantity of wasted extracted material/Quantity of extracted raw material	%	+
	Is the quantity of recycled material as input of manufacturing processes increasing in Peru and Colombia?	Quantity of recycled input material/Quantity of input material	%	+
	Are the material used in Peru and Colombia produced in a sustainable way?	Quantity of used input material ecologically certified/Quantity of used input material	%	--
Production	Is the quantity of raw material used for production decreasing in Peru and Colombia?	Quantity of raw material used for production	tn	++
	Is Peru and Colombia usage of dangerous/toxic substances decreasing?	Quantity of dangerous substances used for production	tn	+
	Are Peru and Colombia generating less wasted materials while producing?	Quantity of production wasted material	tn	++
		Quantity of production wasted material/Quantity of	%	++

		raw material used for production		
Consumption	Are industries adapting circular economy concepts such as remanufacturing or reuse in their production cycle?	Quantity of industries implementing circular economy principles/Total quantity of industry	%	-
	Are consumers changing their way of doing towards more ecological practices?	Consumption per inhabitant	Kg/inh	+
	Are people using products for a longer period of time?	Average duration of a product life cycle	Years	--
Recycling	Are Peru and Colombia producing less product waste?	Quantity of industrial wasted materials	tn	++
	How much of the wasted material is recycled?	Quantity of recycled materials per products/Quantity of wasted materials per products	%	+
	Which is the benefit of recycling part of the wasted materials?	Carbon emissions	Mt	-
Eco-design	Are products designed in order to last longer?	Product's life cycle/ average life cycle of similar products	%	--
	Are products designed allowing the demanufacturing?	Time (number of tools needed) for the demanufacturing of a product	t	--

Are recycled material included in the design of the products?	Amount of materials(used for a product) recyclable/total amount of material used for a product	%	--
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Table 19 – Value chain proposed indicators

An integrated evaluation system is based on a global vision and seeks to deepen the analysis of material and energy flows, the eco-science of productive processes, as well as environmental interactions and socio-economic changes.

Additionally, information must be available on the processes that, from a "macro dimension", affect the evolution of economic circularity in relation to the use of land, materials, water and carbon emissions. Consequently, all the indicators that show positive trends in this sense indicate favorable changes towards greater circularity in the resource-waste axis. If, for example, energy consumption is reduced to a minimum and comes from renewable sources, not only is the low-carbon economy fostered, but it also has a positive impact on the transition to the Circular Economy.

Likewise, other thematic indicators of different composition that are related to environmental and socioeconomic changes must be incorporated in a complementary manner. In this sense, the effects of the sustainable use of biodiversity, the improvement of air quality and soil management have an important impact. On the other hand, socio-economic transformations also have a high incidence with respect to sustainable mobility patterns, feeding patterns, efficiency in buildings or land uses among others.

Likewise, it is important to contemplate the relationships with the processes of social change that are derived from the implementation of innovation policies, horizontal instruments and changes in habits, as well as new ways of behavior of citizens-consumers-users. An example of this would be the conditions of fair prices with internalization of externalities and ecological taxation: prices are marked according to their real cost to favor rational consumption. Particularly noteworthy in this regard is the role played by Ecological Taxation, in general and, more particularly, the approach defined as Ecological Tax Reform to create conditions of double economic and environmental benefit. However, and despite a greater incidence in the last two years,

in relative terms, the fiscal pressure on the environment in Spain is still moderate in comparison with the more advanced European countries. Incentives for public-circular public procurement are also essential for models of exemplary public management. In both cases important advantages are obtained to improve and incentivize Circular Economy processes.

In order to create an integrated system and have a wider view, it is also necessary to include in the evaluation system a set of indicators about the level of consumption of the main natural resources:

Area	Possible indicator	Unit	Data availability
Energy	TPES	toe	++
	Renewable energy usage/Total energy consumption	GWh	++
	Energy consumption/Volume of economic activities (TPES/GDP)	E/\$	++
Air	Carbon emissions	Mt	++
Water	Reused water/Total water usage	%	-
Soil	Tatal urbanized surface	km2	++

Table 20 - Natural resources proposed indicators

In particul for what concern table 12 it was possible, due to the accessibility of reliable data, to perform a numerical and comparative analysis between Peru and Colombia which is reported in *Annex A*.

3.2. Qualitative Analysis

To the extent of providing the more detailed view possible to foreigner companies willing to invest in Peru and Colombia on businesses or activities based on the circular economy model, along with a quantitative analysis, it is smart and efficient to develop a qualitative one as well. In particular, it is possible to think of a framework able to analyse any practical case known and collected.

More in detail the framework is structured in four fundamental phases as shown in figure 9:

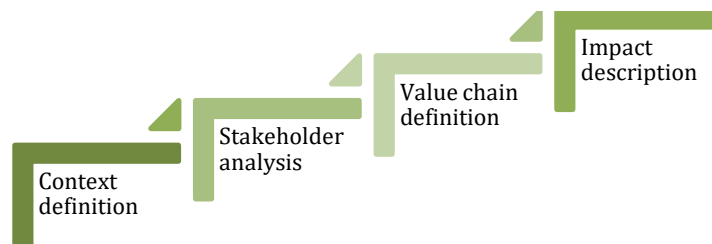


Figure 9 - Qualitative analysis diagram

Before starting with the description of each of the phases, it is useful to remind why the qualitative part of the analysis is important; multi-objectives and multi-stakeholder organizations cannot be represented just with numbers: a qualitative description is needed. The qualitative nature of social impact makes it difficult many times to collect enough data to get statistics out of them; as a consequence, the cost of measurement results extremely high. Last but not least, potential long-term changes can better be detected by a qualitative analysis.

3.2.1. Context Definition

Locate the specific case in space and time as a starting point of the analysis: this is the introductory part of the framework but still very important as long as it constitutes the first impression a company's representative may have. It is possible to identify five main phases to describe the context:

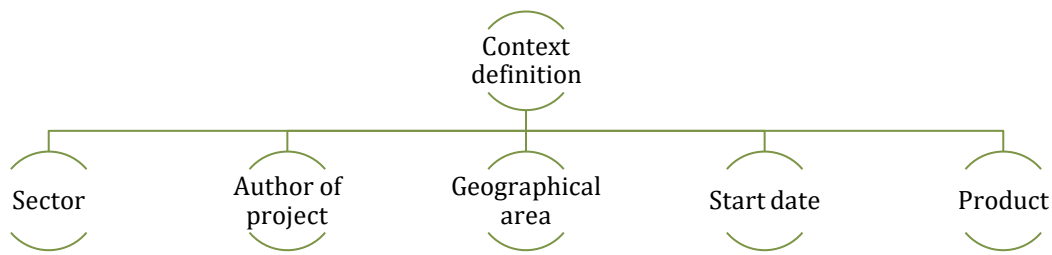


Figure 10 - Context definition diagram

First of all, the economical or industrial sector should be specified as first information of a practical case analysis; second, the author of the project or idea. Then a context definition will also describe the geographical area where the project is realized and when (in term of the period of the year and of time to get the project done). Last and most important the product or service the project is about. The five classification criteria composing the context definition have been selected on the base of possible statistics believed useful for potential investors.

3.2.2. Stakeholder Analysis

The first step in stakeholder analysis is the identification and mapping process. It consists of listing a set of people and organizations affected by the project or company activities, who have influence or power over it or have an interest in its successful or unsuccessful conclusion.

The stakeholder analysis should begin with a brainstorming which in this case means discuss about accuracy of the selected stakeholders by the model. It is important this process is carried out considering stakeholders according to their involvement, emotional and financial investment, and other specific criteria related to the particular project. In general, this framework will take into consideration the following five questions:

1. **Who are the stakeholders who have the most influence on the project?** These will involve most of all client-side people - typically their project team, the project sponsor, and the executive sponsor.
2. **Which stakeholders will be most touched by the project?** This can include people belonging to the previous group, but may also involve outside actors.

3. **How should have to be handled important actors who actually will not be considered stakeholders?** For instance, in a software project, there may be executives elsewhere on the software team who are key leaders in their department, and who may need to be kept in the loop on certain things. Keep these people little involved since they may possess the power to raise concerns or create roadblocks.
4. **Who has the control on the resources?** These will be stakeholders on the client side as well as on the agency's side, in case a change in the budget or require more allocated resources from a certain discipline is needed.
5. **What are the top motivations and interests of your stakeholders?**

When it comes to map out all the stakeholders they will be divided in 2 macro-categories: internal stakeholders and external stakeholders.

Within each macro-category these are the main divisions each stakeholder can belong to:

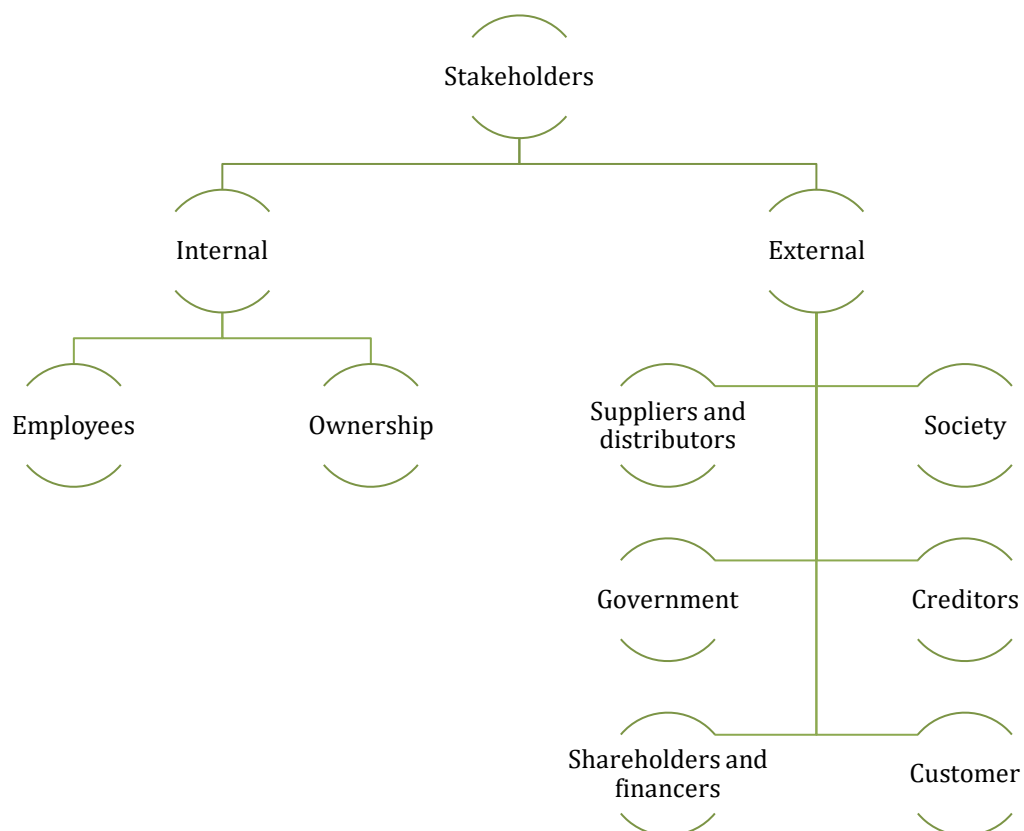


Figure 11 - Stakeholders analysis diagram

Figure 12 is a representation of how the framework will graphically map the identified stakeholders:

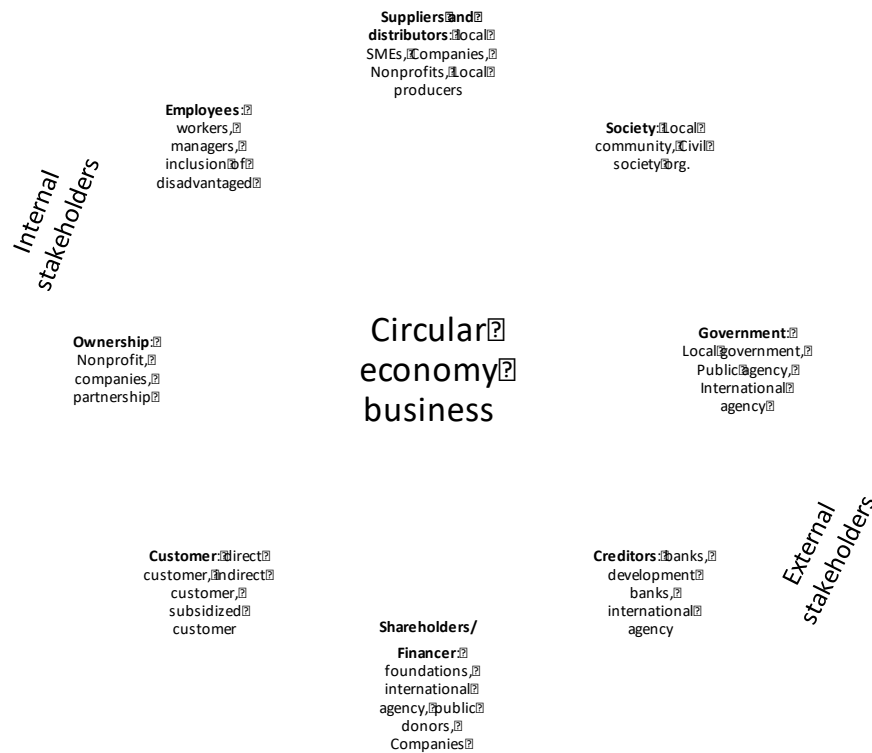


Figure 12 - Stakeholder map representation

3.2.3. Value Chain Definition

To introduce the concept of value chain a comparison with the supply chain will be made at first. Supply chain is the system and resources needed to make a product or service go from supplier to customer. The value chain concept comes from the supply chain as it considers the way in which value is created along the chain, on both product/service and the actors involved. From a sustainability view, 'value chain' generates more attention, since it clearly references internal and external stakeholders in the value-creation process.

It also stimulates a full-lifecycle perspective and not just an emphasis on the (upstream) provisioning of inputs. Value is widely used in a strict economic sense, but it can be intended with a different meaning, i.e. ethical and moral concerns as well as other non-monetary utility values such as closing material loops, the provision of ecosystem services and added customer value.

As for the specific value chain model characterizing the proposed framework, it has been identified the following five main phases:

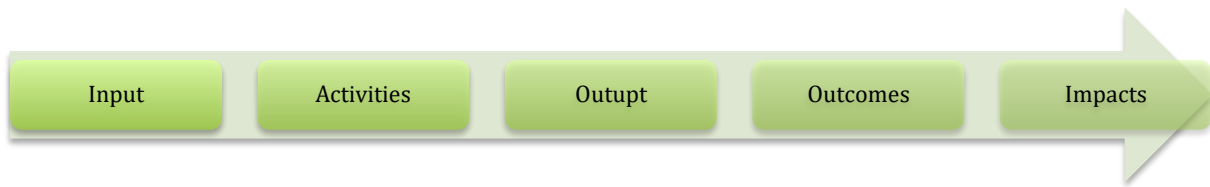


Figure 13 - Value chain definition analysis

At each of the phase corresponds respectively the following description:



Figure 14 - Description of value chain stages

Here following an example regarding a Circular economy project in agriculture will be presented to show how this model works:



Figure 15 - Example of value chain

3.2.4. Impact Description

As previously mentioned Circular economy is one of the five new paradigms generated by social innovation. This new word means social and environmental results not only has to be the consequence of grants or other charity funds, but a new type of company can rise up if the economic profitability (limited with a specific regulation) and social and environmental results can be bind in a successful combination.

That is the general idea lying behind the circular economy concept; in order to be successfully applied, at the beginning most of all, companies have to understand this is not only a kind of social charity or responsibility but a new, innovative, and profitable way to make business and take care of social and environmental problems. The chance is big for developing countries as their development is going on right now, so why do not make it in a sustainable way.

Giving this introduction it is easy to understand that the proposed framework, when it is time to communicate the results and the impact, is not only evaluating the economical part but considering the social and environmental component as key for the results description. This is a graphical representation:

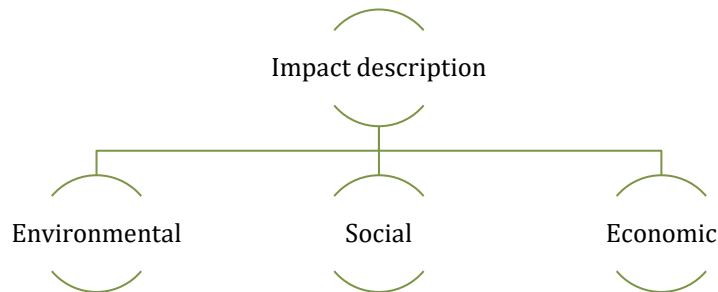


Figure 16 - Impact description diagram

1. **Environmental impact:** This part describes either the directly negative or positive consequences of company business activities on the place where they are operating, and the indirectly influence on other places.
2. **Social impact:** This part talks about the positive or negative social impact the company is delivering while operating in a determined area. It is easy to understand that positive results mean an easier acceptance by the hosting community.
3. **Economic impact:** as previously explained, circular economy has not to be a way of giving funds away for free for the image of the company but a profitable way to make it better for the hosting country or community and an innovative way to make business. This means that economic results has to come along with social and environmental ones.

3.3. Evaluation system potential barriers

The transition toward circular economy has to face different barriers. It is necessary to work on material cycles and energy and the main effort have to be done by local government. This kind of radical change requires for sure a high level of innovation.

- **Legislation:** the actual legislation of the two countries presents several gaps regarding the usage of energy or the waste management at an industry level. It

is necessary to implement a normative that define the concept of waste and how it have to be managed including: collection, transportation and recycling.

- **Economy:** clearly, as this represents a new method of running business, the only way it can succeed is to proof its profitability and sustainability in the long term. Government should consider the possibility to introduce different reward system or incentive for companies which implement green policies.
- **Culture and education:** not only industries have to change their way of doing, also consumers have to be more conscious and responsible for the environment, focusing on the preservation of natural resources. An idea is to create courses for professionals in order to create new job opportunities.
- **Technology:** this is a critical point for South America. Compared with Europe, Peru and Colombia are still developing countries and the level of technologies implementation remain lower than manual activities. Anyway, thanks to different associations, they are investing a lot in technology sectors also taking into consideration environmental issues.
- **Country development:** there are thousands of business opportunities for Peru and Colombia in recycling and reuse of materials, being this economical field almost unexplored.

4. Practical Examples

This paragraph reports an application of the qualitative framework. Among various cases spotted in both countries, two of them have been selected. The entire list is reported in the *ANNEX B*.

4.1. Building a Sustainable and Competitive Cocoa Value Chain in Peru

This paragraph has been introduced to provide a practical example of successful business case in Peru. After an accurate study of different cases, both considering the experience on site and cases associated to companies which joint the PEC, Plataforma de economia circular, considering parameters such as the reliability of data, the referral context and impacts, the most interesting case is the one regarding Cocoa Value Chain.

The idea is also to provide a practical example of how to use the proposed framework reported in the qualitative analysis paragraph. The framework has to be easily applicable and less time consuming, allowing potential investors to take into consideration existing cases and successful projects.

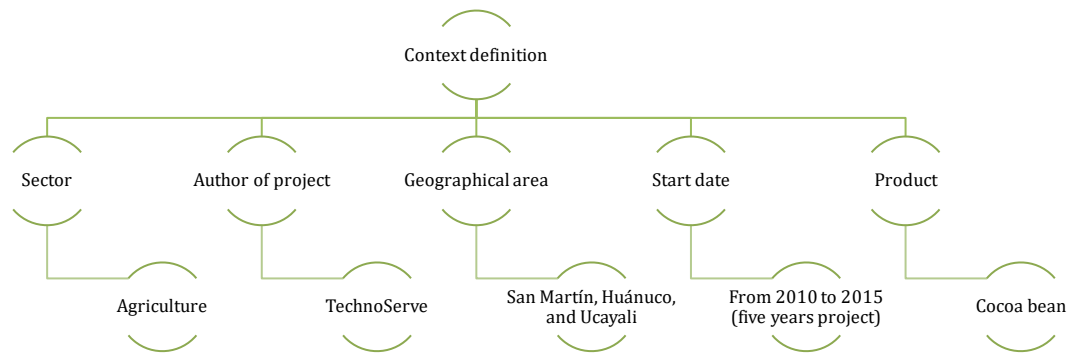
4.1.1. Context Definition

The global cocoa producers are Côte d'Ivoire, Ghana and Indonesia accounting for two-thirds of all output. Latin America, including Peru, on the other hand, represents a relatively small share of the market; the region's 190,000 cocoa farmers produce only 16 percent of the world's total supply. Peru is the world's ninth largest cocoa producer. Approximately 60 percent of productions is exported, either as raw cocoa beans or cocoa



Figure 17 - Cocoa farms

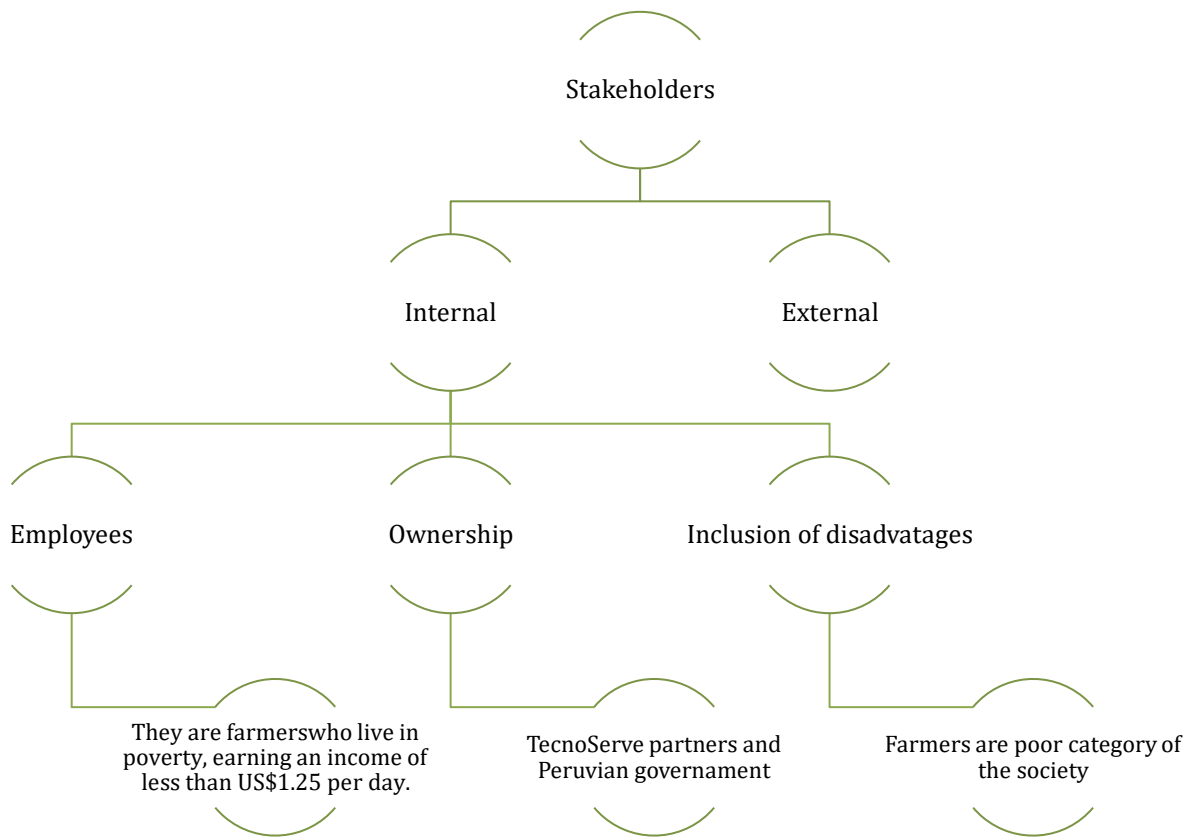
derivatives. Peru's 45,000 cocoa farmers have an average farm size of two hectares, and only about 20 percent belong to a producer association or cooperative. In order to follow the framework, the main area of context definition are reported in graph 22.



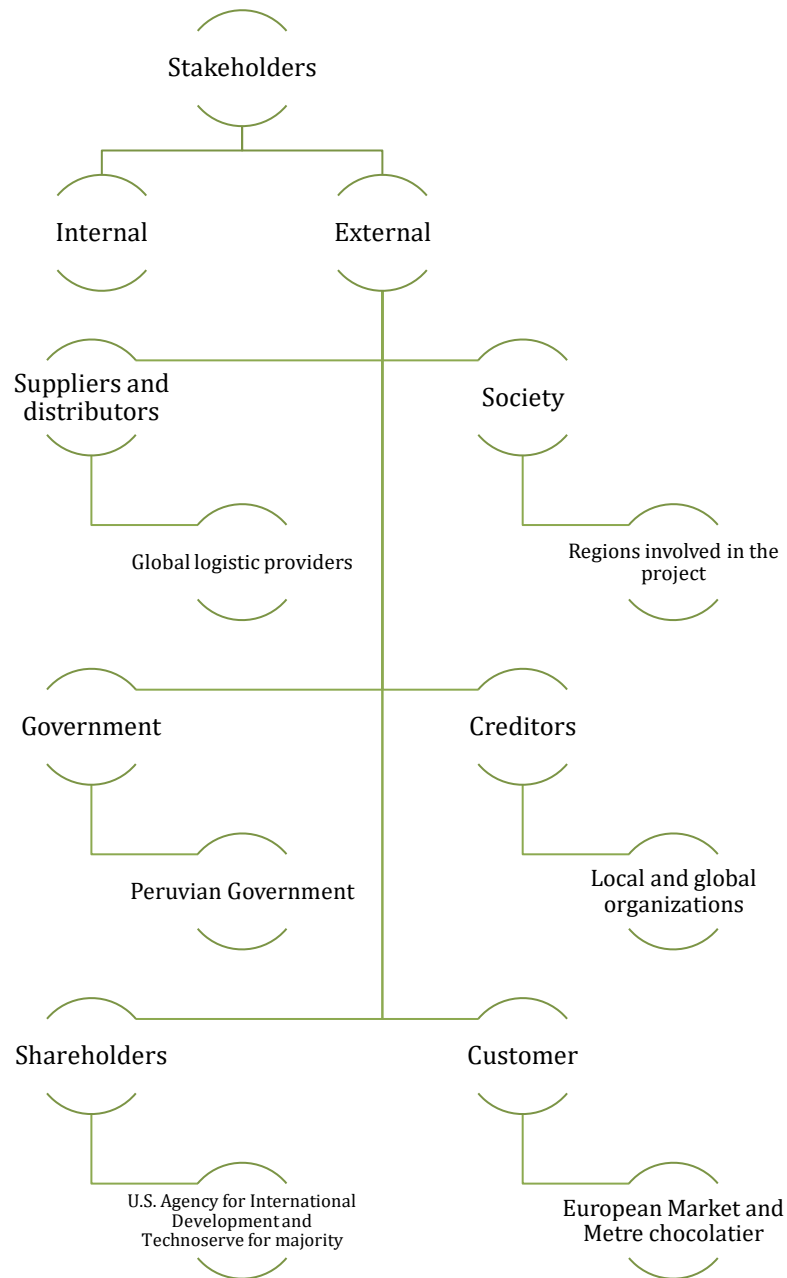
Graph 22 - Context Analysis Diagram - Peru practical case

4.1.2. Stakeholder Analysis

The set of people involved in the project and in the different activities are mainly the farmers, the investors and the public governance. They have the influence and power over the critical decision and have interest in its successful or unsuccessful conclusion. Since the 1960s, the Peruvian Government, with support from USAID and other international donors, has implemented a policy of eradicating coca. Over the last two decades, policymakers and development agencies have formed a consensus that eradication efforts are more effective when paired with “alternative development” the promotion of other income-generating crops such as coffee, cocoa, and oil palm. In 2010, USAID and the Peruvian government identified a strong business case for further intervention in the cocoa value chain. Although the government continued to plant new cocoa farms and total production was growing, many small farmers were not producing cocoa competitively. USAID engaged TechnoServe to help farmers improve their competitiveness through productivity-enhancing agronomic training and by strengthening producer organizations to improve cocoa aggregation and market access. To carry out this work, TechnoServe partnered with private sector supporters, Peru’s National Commission for Development and Life without Drugs, and the regional governments of San Martín, Ucayali, and Huánuco. Together, these partners formed the Economic Development Alliance, which worked from 2010 to 2015 to improve smallholder cocoa farmer livelihoods and to strengthen the nascent cocoa value chain. A graphical overview is provided in graph 23.



Graph 23 – Stakeholder analysis Diagram – Internal - Peru practical case



Graph 24 - Stakeholder Diagram – External - Peru practical case

More in detail the key program partners are:

- U.S. agency for international development (USAID): USAID is the U.S. government agency working to end global poverty and enable resilient, democratic societies. As the Economic Development Alliance’s primary donor, USAID was a key partner in developing the intervention strategy and managing program implementation.

- **Public and Private Sector Supporters:** A number of other organizations generously contributed funds and provide resources to support the Economic Development Alliance, including: the PIMCO Foundation, the Peru Opportunity Fund, the World Cocoa Foundation, the West Foundation, Weidemann Associates, and the Government of Peru’s Agroideas and Procompite programs.
- **National Commission for Development and Life Without Drugs (DEVIDA):** DEVIDA is the Peruvian Government agency that oversees coca eradication and alternative development efforts. DEVIDA and TechnoServe worked closely to align program interventions with the Peruvian government’s policies and strategies.
- **Producer Organizations:** The Economic Development Alliance partnered with 23 cocoa producer associations and cooperatives. These organizations were critical for strengthening the cocoa value chain by improving aggregation and facilitating market access for farmers.
- **Regional Governments:** TechnoServe worked closely with the regional governments of San Martín, Ucayali, and Huánuco. Local government partners supported project implementation by coordinating activities and providing agronomic training through government extension agents.

4.1.3. Value Chain Definition

In order to increase productivity and improve cocoa sales, TechnoServe intervened at several levels of the cocoa value chain: production, aggregation, and market access. Always considering the qualitative proposed analysis for each face of the value chain following there is a description:

Input: different kind of seeds, lands, water irrigation, workers on site, machinery.

Activities: In order to increase cocoa productivity, TechnoServe identified a unique set of high-yield- in agronomic practices, now known as the Synchronized Fertilization and Pruning Technique (or “TAPS,” its Spanish acronym). TechnoServe scaled up TAPS by establishing demonstration plots and farmer schools to train smallholder cocoa farmers. TechnoServe also supported the planting of new cocoa farms.

Output: Small-scale cocoa farmers need to aggregate their production in order to achieve the volumes required to sell directly to cocoa exporters. The Economic

Development Alliance improved cocoa aggregation by strengthening producer organizations through business advisory services and by facilitating access to enhance. To achieve further economies of scale, the project organized Commercial Blocks of several producer organizations, which aggregated large orders of cocoa beans to meet exporters' quantity requirements.

Outcomes: The Economic Development Alliance worked to promote increased cocoa sales by program-supported producer organizations. TechnoServe supported artisan chocolatiers and market promotion events to raise the international profile of Peruvian-origin cocoa. Additionally, TechnoServe facilitated cocoa sales by organizing business rounds for producer organizations to network with buyers and by directly connecting Commercial Blocks with cocoa exporters.

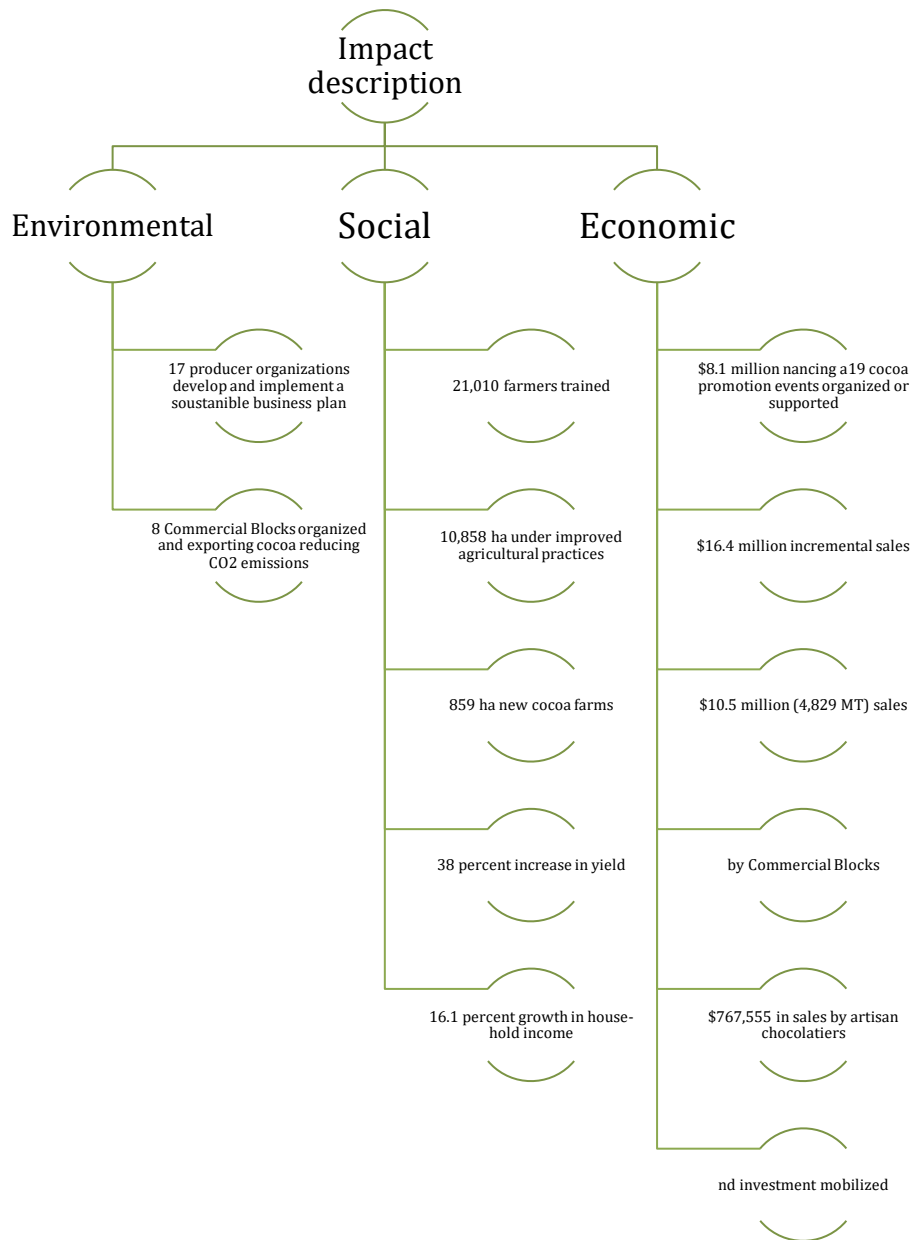
Impacts: Impacts are better explained in next paragraph.



Figure 18 - Cocoa value chain

4.1.4. Impact Description

Considering the three main drivers for each project intervention it is possible to find a different impact results. In particular the implantation actions are divided in production and address Smallholder Cocoa Farmers, Aggregation for producer organization and facilitate Market Access for Cocoa Buyers.



Graph 25 - Impact diagram - Peru practical case

4.2. Bioestibas: a Colombian circular and profitable business

This part of the report consists of providing the future user with a real case experienced during the staying in Colombia. This case has been selected among various presented during a conference held by “plataforma de economia circular en las Americas” in Medellin. All of them are considered quite interesting local attempts of developing business models based on circular economy but, considering the overall idea, the parameters to be taken into account based on the evaluation system created and the

reliability of the data, Bioestibas has been selected as the best match with the previous mentioned characteristics.

More in depth, the purpose is to give an idea of how the proposed framework works and how efficient can be when analysing real cases in term of qualitative information.



Figure 19 - Bioestibas product

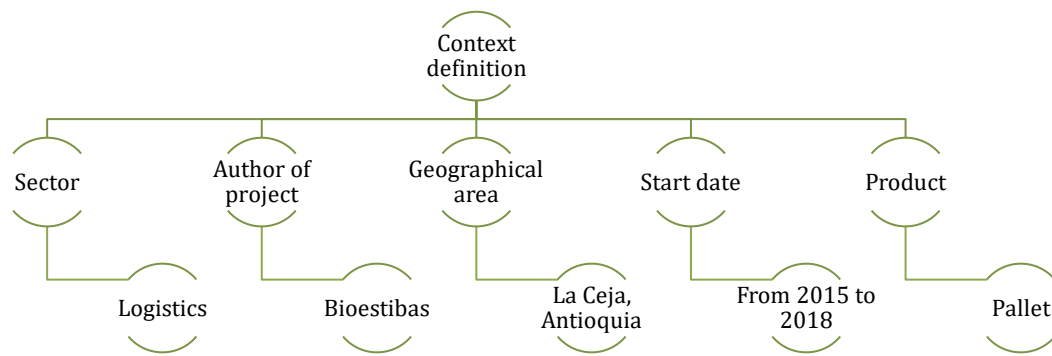
4.2.1. Context Definition

BIOESTIBAS is a company producing and selling ecological pallets made of an agriculture waste which is very contaminating. It is characterized by high innovation grade in its productive process, gaining a way better product compared to the ones available in the market.



Figure 20 - Bioestibas value

Taking advantage of the agriculture waste generated by flower cultivations (stem of hydrangea) it is possible to prevent the cutting of forests. The hydrangea is a beautiful flower which became a very precious exportation product. Among Colombian regions cultivating this specie west Antioquia stands out, where nearly 800 cultivators generate more than 6000 monthly tonns agriculture surplus, made up mostly by flowers' stem. The final disposal of this surplus is a huge environmental problem as most of it is eliminated by means of combustion. Controlling this growing reason of contamination is the challenge of Bioestibas.

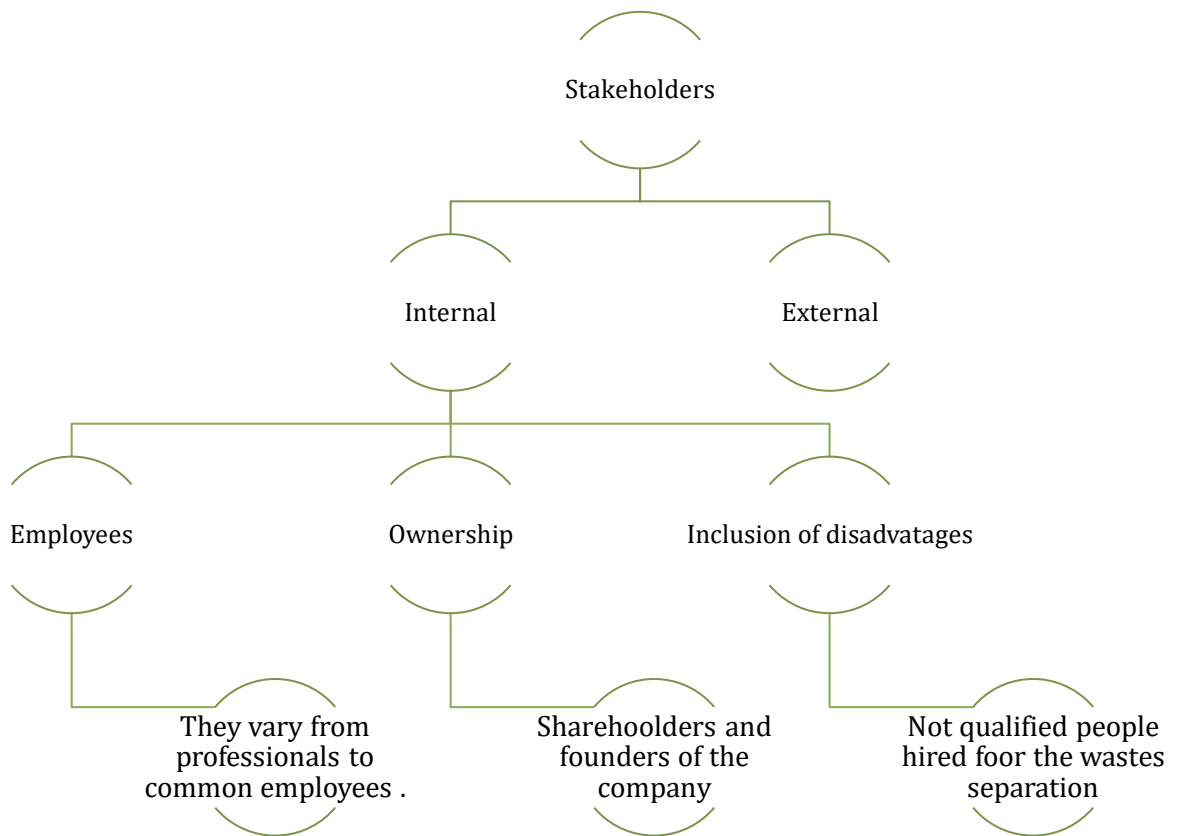


Graph 26 – Context definition Diagram - Colombia practical case

4.2.2. Stakeholder Analysis

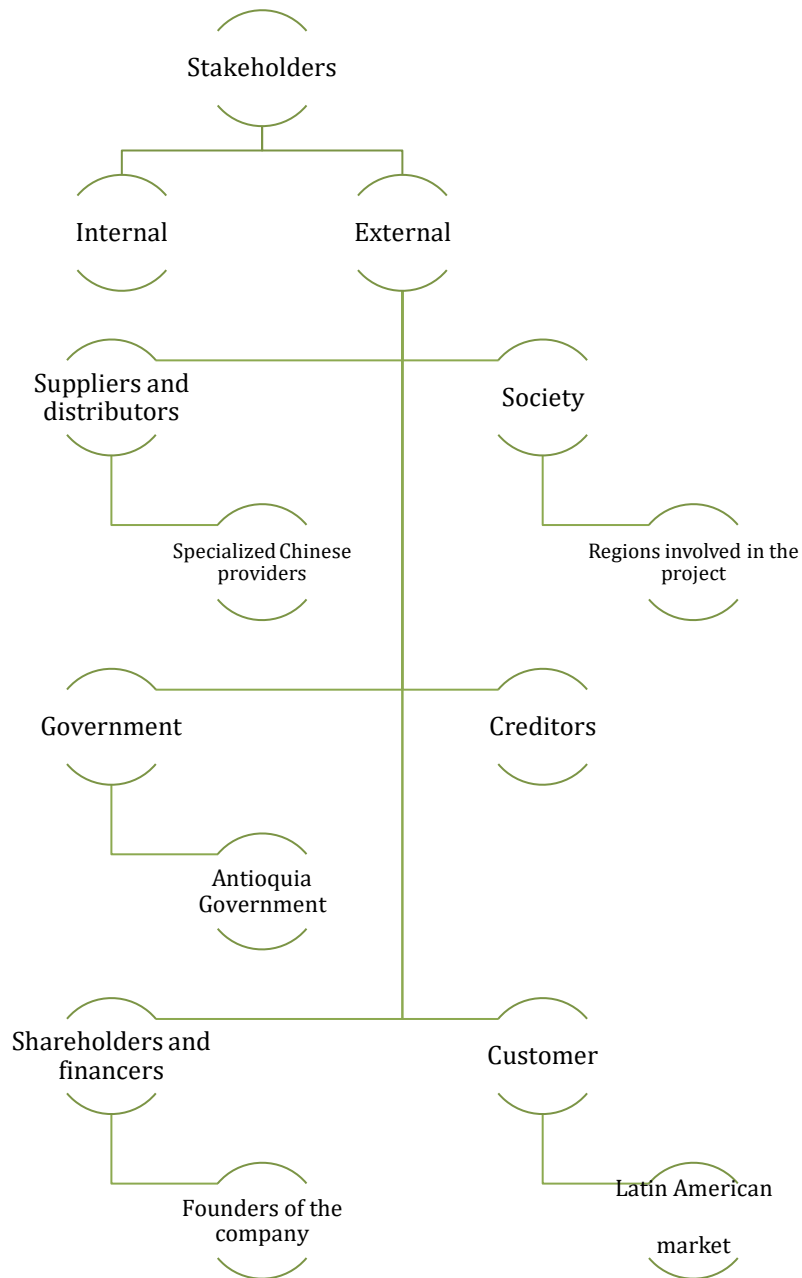
There are three main parts involved in the development of the company, which constitute the most important stakeholders; Antioquia department government, which have been fostering sustainable economic development during many years, also promoting many conferences and events for people education about the topic; the Universidad Nacional de Colombia in Medellin, which is the responsible for the research and discovery at the base of the company business. The original entrepreneurs, which constitute the ownership and financiers of the company, that made their plant available for the practical experimentation of the theoretical results reached by Universidad Nacional de Colombia. Along with that, they visited many times Popular China Republic where either they got very useful advices about how to carry the process out and found the proper suppliers.

This business also gave the opportunity to create both professional and normal employment; along with it, the advantage for the local community has been important due to the high number of trees saved from the cutting with consequent higher quality of air and general healthiness.



Graph 27 -- Stakeholder analysis Diagram – Internal - Colombia practical case

As for the inclusion of disadvantaged people, wastes separation is quite an easy job and does not require any specific qualification; this gave both the company and local government the possibility to hire without any job and study title, increasing the welfare of the community.



Graph 28 -- Stakeholder analysis Diagram – External - Colombia practical case

4.2.3. Value Chain Definition

As this business pursues a circular economy model, circularity is applied at several stages of the value chain:

Input: The product is made by flowers' wastes, in particular the hydrangea, which is a beautiful flower which became a very precious exportation product. Among Colombian

regions cultivating this specie west Antioquia stands out, where nearly 800 cultivators generate more than 6000 monthly tons of agriculture surplus, made up mostly by flowers' stem.



Figure 21 - Input materials

Activities: they generate value from 60.000 tons of agriculture wastes generated in Antioquia regions. In particular, they realized the majority of wastes was constituted by hydrangea. Here came the idea of studying a possible reuse of this surplus through the help of Universidad Nacional de Colombia. The result is that they produce a very innovative pallet made of this flower waste, which is able to guarantee higher performances than same products made of non-recycled wood.

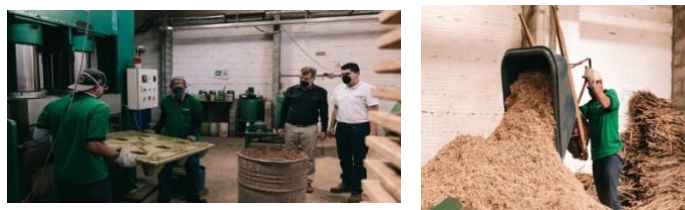


Figure 22 - Main activities

Output: as previously mentioned, the output is an innovative pallet made of a recycled material which would be very dangerous for the environment. This product can stand a maximum load of 4300 Kg, has a density of 750 kg/m³ and is 2,3 times more resistant than a normal pallet. They are resistant to water, fire and wood insects. Finally, they are compatible with normal forklifts.

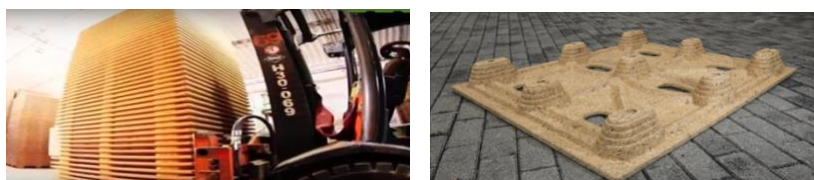


Figure 23 - Main proces output

Outcomes: the fabrication process make this product more stable and durable over time. It is classified as a compressed wood pallet and internationally recognized, facilitating then the process of exportation. When used, they occupy $\frac{1}{4}$ of the volume

normal ones would occupy, facilitating workers job and guaranteeing more security; this also cause a decrease in the cost of stock and logistics in general

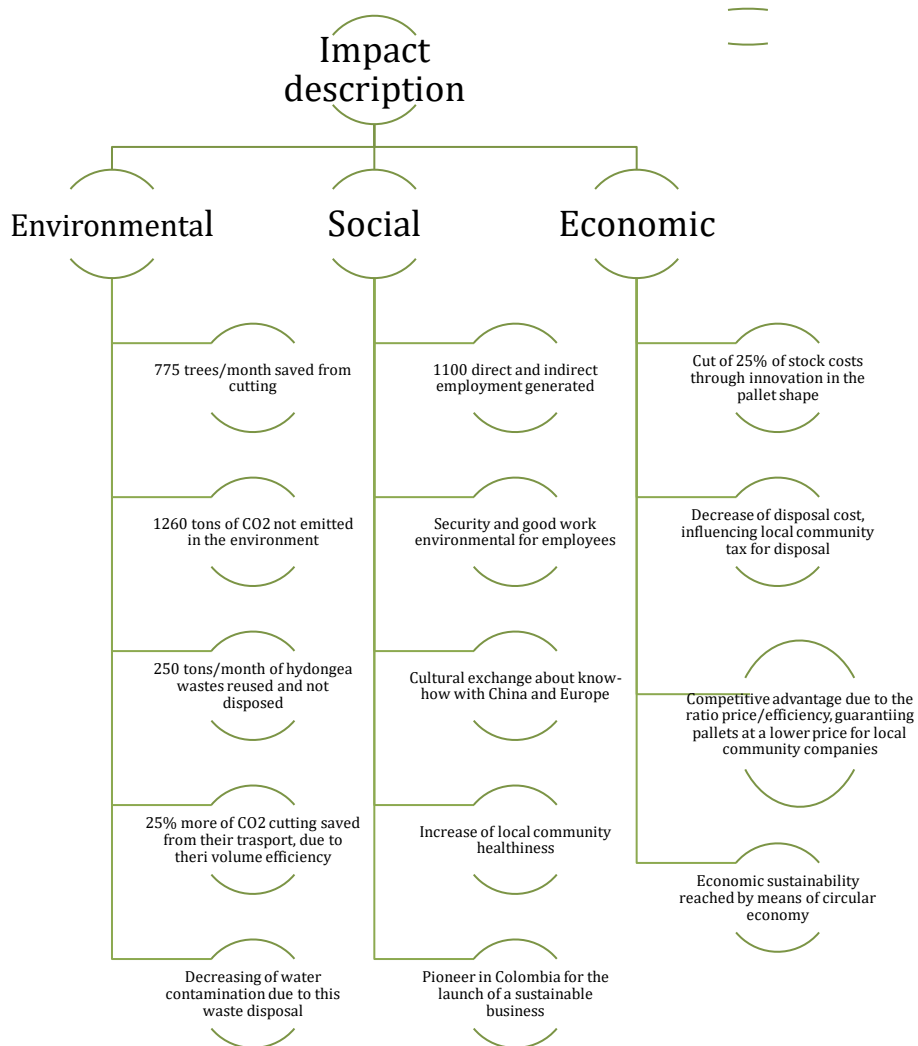


Figure 24 - Main proces outcome

Impacts: it will be explained in the next paragraph

4.2.4. Impact description

Considering the triple bottom line characterizing the circular economy it is possible to give a full picture of the impact brought by this business initiative.



Graph 29 . – Impact description Diagram - Colombia practical case

5. Conclusions

5.1. Description of the Methodology

As already mentioned all along the report, the particularities have been considered and some reflections was made about each part, particularly on the data collection process and the methodology.

Deepening into the process:

- First of all, it was important to take vision of the consolidated and wide literature regarding circular economy as a concept and to start thinking about how to adapt it to particular considered situation. As the idea of circular economy was born in Europe, mostly focusing on the scarcity of resources problem, it was necessary to rethink and set it on Latin American “social and economic shape”. Futhermore, it has been necessary to go through some initial difficulties as, for example, the concept of circular economy, which was intended as recycling only, even in the academic environment. Therefore, what it is possible to find here is a Latin American version of circular economy as a result of an attempt of both not to lose its esencial principles and, at the same time, shaping it over the context taken into consideration.
- To give a better idea to potential interested investors, a socio-economic analysis of both countries was performed. In particular, it was highlithed how welfare is distributed across the population, what are the most developed economic sectors and the most important industries streams, what are the main features of the population of both countries. Last but not least, it results pretty clear as the two of the countries abonded of raw materials and minerals of many types, giving straight away the idea to the users of how Colombia and Peru have got a great development potential and how much interesting they are for future investments.
- The following part of the analysis was characterized by difficulties related to to data collection. The possibility to collect reliable data became strongly difficult as, quite easy to imagine, Latin American countries have not the same availability of Europe in terms of data and information, particularly for some sectors or very specific activities. At an early stage we have mostly made use

of countries statistics and data of official departments, while later on we have had the availability of quite large database from hosting universities.

- The evaluation system surely represents the core of the thesis project. During the six months in Latin America it has been possible to directly see, discuss and analyze real cases thanks to the support of tutors or companies interested in expanding and improving this innovative view of making business. That means it has been possible to put together various attempts or experiences of application of circular economy, even if they were limited sometimes. This possibility changed the original idea of creating a pure numerical grid to evaluate the circular economy and its development in the mentioned geographical area. Potential European companies willing to develop business or projects based on this innovative model need a wider picture of the situation. This led to an enlargement of the evaluation system through the creation of a qualitative part: it was created a framework able to classify and analyze practical cases, providing users with pieces of qualitative information you cannot find in numerical analysis; of course its structure has been adapted to the case (the stakeholder analysis for example). Thanks to this system a foreigner company can have a global idea about what is going on now and it would go on in case of investment.

5.2. Final Conclusions

As previously mentioned at the end of the socio-economic analysis of the two considered countries, there are several differences between Europe and Latin American which should be highlighted for their influence on the created model:

- In Europe, as almost all sectors are saturated, the circular economy model is an opportunity to implement sustainable models to better exploit the raw material usage. In addition, the other big advantage is the generation of new job opportunities. On the other side, in Latin America natural resources are present and abundant. For this reason, extraction and mining are the main sectors of those countries, also driving their economical growth. Anyway, this is not sustainable for two reasons: the bad exploitation of the resource is not affordable and sustainable in the long term, and an inappropriate use of them

results in negative impacts on local population health and environmental pollution.

- In Europe, due to the high grade of country development, it is possible to implement circular economy at each stage of the value chain indifferently; in addition there is the possibility to collect and have access to different kind of data. In south America, recycling, remanufacturing or demanufacturing are concept not well developed at the moment. For local characteristics, extraction and production are simpler to be implemented and it is easier to see tangible improvements. As for the eco-design it nearly does not exist apart from few exception.
- From a social point of view, Europe can count on a higher degree of education and awareness about environmental problems. In Latin America in fact, environmental problems are still considered of “second level” if we compare them with issues such as corruption or poverty which result immediately identifiable and tangible for local communities. Specifically, poverty and socio-economic status is a big challenge for those countries where the majority of population have not an adequate level of income.
- Latin American countries are by far less densely populated than European ones, as their geography includes large deserts, mountain ranges, and tropical forests, and they developed through a much shorter agricultural history than Europe. This lead to a final energy consumption significantly lower than the old continent. In fact, European population on average, uses more than twice the energy per capita as Chile, which has the highest energy use per capita among the countries.

Given these differences, the proposed method aims at helping on one side European companies, which would be able to understand the circular economy development grade in emerging economies countries, and use it as an indicator of readiness of those governments to accept different business models implementations; on the other side, it would permit local institutions to better choose among different competitors also considering environmental and social improvements they would bring.

The final purpose of this accurate analysis about these two emerging countries, is to create a precedent for durable and strategic synergies between continents. In order to

do so, of course, advantages on both sides have to be agreed, creating a win-win solution and a profitable agreement in the long term.

More in detail the following paragraphs present and explain eventual advantages coming from such potential synergies from the point of view of both European companies and Latin American countries.

5.2.1. European companies' advantages

The European companies considered in this study are, for the majority, profit entities which are willing to invest in emerging countries because they recognised their economical potentiality. According to this, some of the potential advantages are:

- **Obtaining extraction permissions more easily.** It is possible to have it facilitated to obtain the permission of extraction in determined geographical areas. In fact, the right to exploit such areas depends on central government but local ones have a strong influence on local population. Convince them through the positive impact circular economy businesses would have environmentally and socially speaking, would make the process of extraction permission obtainment much easier, also in terms of bureaucracy.
- **Better control over materials characterized by volatility of their price.** This is a huge problem which European and United States must face. As highlighted in the literature review comparison between linear economy and circular economy and in the analysis of Peru and Colombia import and export activities, Europe has a strong dependence from Latin American countries for what regards mineral products. This represents a fundamental challenge to be faced in view of a better resource exploitation. Having the chance to develop more stable relationships and agreements makes it possible to better manage this problem.
- **Brand image improved.** Nowadays the attention for brand image is exasperated. This is due to an always more competitive market and in change of the perception of the final customers. There are several studies which affirm how a marketing campaign based on concepts such as social responsibility or sustainable production is more appreciated than one based only on the quality and technical characteristics of the product.

- **Possibility to build more durable relationship.** The possibility to create steady long term agreements make it possible and convenient the optimization of the whole supply chain, from the extraction of raw material to the transportation and the transformation in final product.
- **Creation of direct negotiation channel.** The direct interaction between local governments and European enterprises could facilitate negociacion related to contractual issues. As known, negotiation is always a cost for enterprises in terms of time and resources and this way it could be minimized. In addition to this, due to local culture characteristics, the possibility to count on a privilegiate negotiation channel in Latin America represents a huge bargaining advantage over competitors for current and future opportunities.
- **Being accepted from local population.** Unfortunately, in Latin America, most of all in the poorest regions, European and North-American companies are seen as “evil entities” which exploit and take advantage of the resources of their territory; this determines a strong distrust towards government, both local and national. The root of this idea comes from historical events. Spain and Portugal first exploited these territories during the colonial age; then the United States created a strong dependence of Latin American countries to their economy through unfair trade agreements, which contributed to enlarge the economical growth gap compared to the western world.

With this historical background, the possibility to develop circular businesses which allows an improvement of the local economies, represents the unrepeatabe opportunity for a company to pass from being the bad exploiter to be the main actor of tangible economic growth of local communities, which comes with social and environmental improvements.

5.2.2. Latin American countries advantages:

The second player considered are latin American countries, with a particular focus on local governments as entities which can condition the final strategic decision for foreign investments: they strongly influence national government consense as for their departements. In this context, the main advatages could be:

- **Economical growth and GDP increase.** Through new sinergies creation there is the concrete opportunity for an economical growth of these countries. The

implementation of new projects increases the GDP directly thanks to an increase of the number of people employed and labor hours worked, thus rising the national production. Investments in both physical and human capital would increase respectively, the quality and quantity of equipment that each worker uses to produce output, and skills and knowledge of employees (through education and training) thereby improving workers' productive capacity.

- **Improvements of available technology.** As reported in the socio-economic analysis above, Latin America countries are strongly dependent from Europe for the importation of machinery and in general technological devices. Given that, the new agreement should bring benefit both for companies and privates which could save money from technological investments using them also for other purposes.
- **Relevant social improvement and evolution.** Social issues are a huge challenge for South America. The inequality and socio economic status affects the population, creating unbalances and dissatisfaction. The improvement and social evolution impact most of all on the poorest areas, guarantying a big step ahead for the whole country development.
- **Huge improvement in environmental sustainability.** Current available technologies are very polluting due to both their retrograde and the lack of a regulation in this sense. More than this, people need to be made aware of this problem and, through specific events and programs, have to be educated in the usage of more environmental friendly technologies.
- **Increase of trust among more disadvantaged people.** National governments need a consense which should be as wider as possible for the stability. The social and environmental improvement European companies would bring and with consequent welfare, represents a tangible result of the government political actions surely appreciated by more disadvantaged people, which in countries like these represent around the 30% of the total population. This will guarantee an important enlargement of the consense, especially across such poor population segments which are usually characterized by great distrust.

Given all the above reported information and assumptions, hereafter it will be illustrated a possible technical and legal solution to develop such synergies and why it has been chosen among various.

According to the economic and real case analysis performed, it has been highlighted that Latin American companies have not come to the point of development in which they started to think about sustainability as an important issue to get competitive advantage.

Furthermore, thanks to the evaluation system created for this project, it has been possible to make a comparison between Europe and Latin America pointing out significant differences for the final proposed solution:

- Circular economy is for Europe a transition to the sustainability; due to the diversity of the context, this phenomenon represents for Latin America an innovative way to address the economic development and create a green economy
- Compared with Europe, there is a huge disparity in terms of education and economic development. In this way it is not possible to develop circular economy at all stages of the value chain in Latin America

This comparison underlines the need for Latin American countries of know-how and knowledge from European companies to carry out and help an economical development under the circular economy perspective.

Moreover, as previously analyzed in the socio-economical part, welfare is not uniformly distributed across the population creating great disparities among social classes; this results in unsatisfied social needs, such as:

- access to basic services for the lowest classes,
- lack of involvement and integration that fosters the active participation of more disadvantaged people,
- lack of ability to form stable employment and enable facilitating the integration of disadvantaged people.

All the premises above listed represent the perfect context for a venture collaboration of both sides in the form of social enterprise, with the goal of developing circular economy. More in detail, overcoming the concept of non-profit company, this is an innovative form of business which has as primary aim the creation of a positive social

impact. The activity of generating revenues thus becomes a means to reach social goals, thus creating economic profitability and delivering social and environmental positive impacts at the same time; European companies in this case would be both funders, using innovative methods of social finance, and bearer of advanced technologies and know-how to facilitate the process and make it interesting for Latin American countries. On the other side, European companies would be admired and gain a good image in the community where they are operating and by local government: if they have to choose among several companies this would be a strong advantage. In the last days EcoPetrol made an environment disaster in Colombia unleashing the anger of the population and compromising its presence in the place; this is only the last event of a long series which have rose the awerness of a need of a more sustainable exploitation of local resources. Along with this aspect a venture like this would bring new job opportunities for the local community, which is really appreciate in poor regions. More specifcly they would be qualified and value-adding and not volatile jobs, thus really contributing to the growth of the country.

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27. INEI - Instituto Nacional de Estadística e Informática: <http://www.inei.gob.pe/>
28. SUNAT - Superintendencia Nacional de Aduanas y de Administración Tributaria:
<http://www.sunat.gob.pe/>
29. PRODUCE - Ministerio de la Producción: <http://www.produce.gob.pe/>
30. MINAG - Ministerio de Agricultura: <http://www.minag.gob.pe/>
31. MINEM - Ministerio de Energía y Minas: <http://www.minem.gob.pe/>
32. MEF - Ministerio de Economía y Finanzas: <http://www.mef.gob.pe/>
33. MINCETUR - Ministerio de Comercio Exterior y Turismo:
<http://www.mincetur.gob.pe/>
34. PROMPERU - Comisión de Promoción del Perú para la Exportación y el Turismo: <http://www.promperu.gob.pe/>
35. ProInversión - Agencia de Promoción de la Inversión Privada Perú:
<http://www.proinversion.gob.pe/>
36. World Bank: <http://www.worldbank.org/>
37. UNODC - United Nations Office on Drugs and Crime: <http://www.unodc.org/>
38. US Department of State: <http://www.state.gov/>

Annex A

This annex reports the a compative analysis of Peru and Colombia related to the quantitative system of indicators. Due to the accessibility and reliability of data, with this analysis it is possible to monitor how mega trends are behaving.

Energy evaluation

In order to evaluate the energy consumption, it is possible to use the TPES (total primary energy consumption). The TPES is the total amount of primary energy that a country has at its disposal. This includes imported energy, exported energy (subtracted off) and energy extracted from natural resources (energy production) as shown in figure 17. The unite of measue for this indicator are tons of equivalent oil (toe).

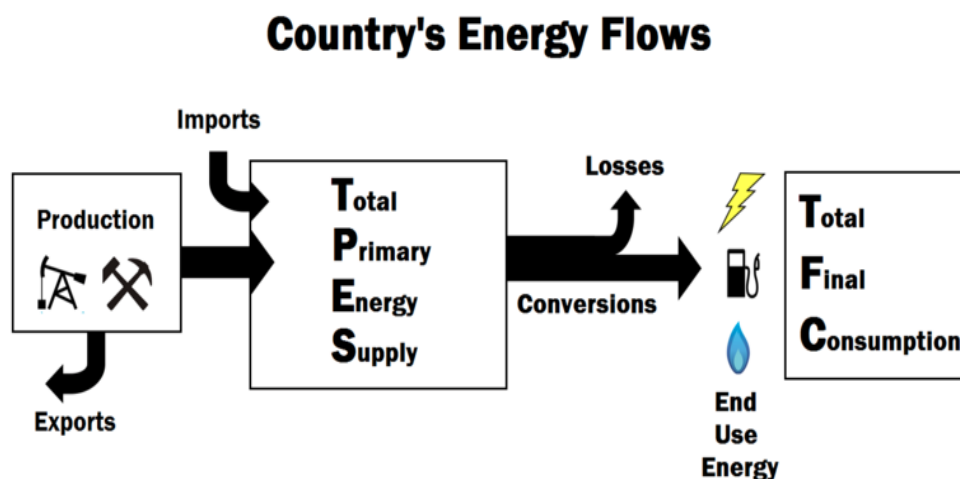
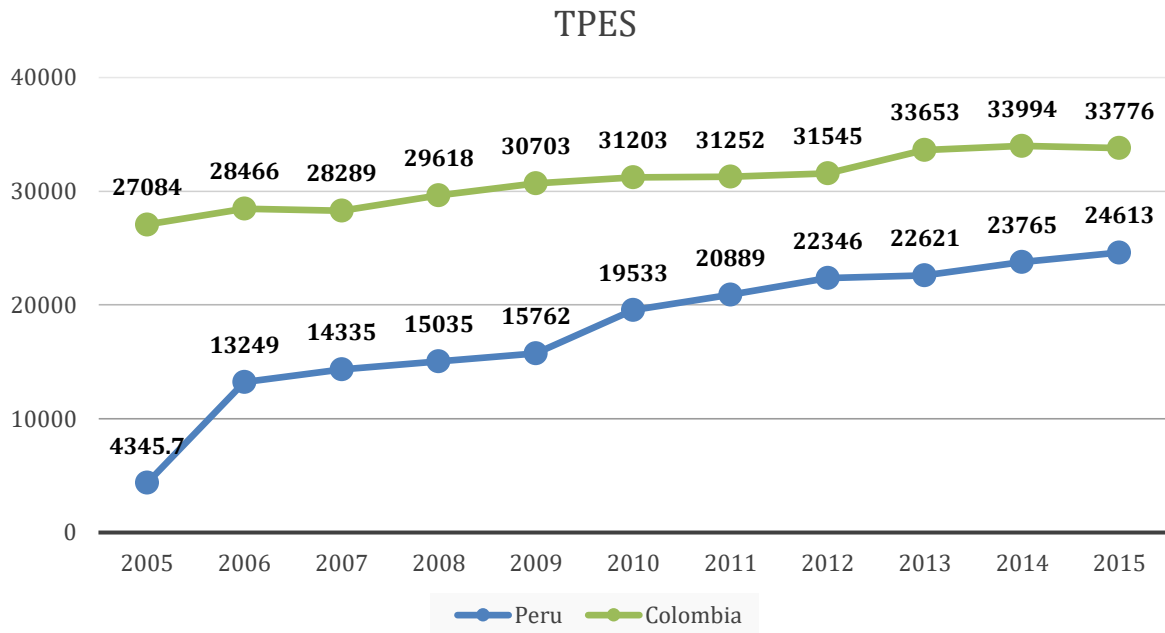


Figure 25 - Country's energy flow

TPES Comparison

The growing trend of TPES of both the considered countries for the research, is mainly given by an increasing in production, which along with import and export constitute the three components of this indicator.

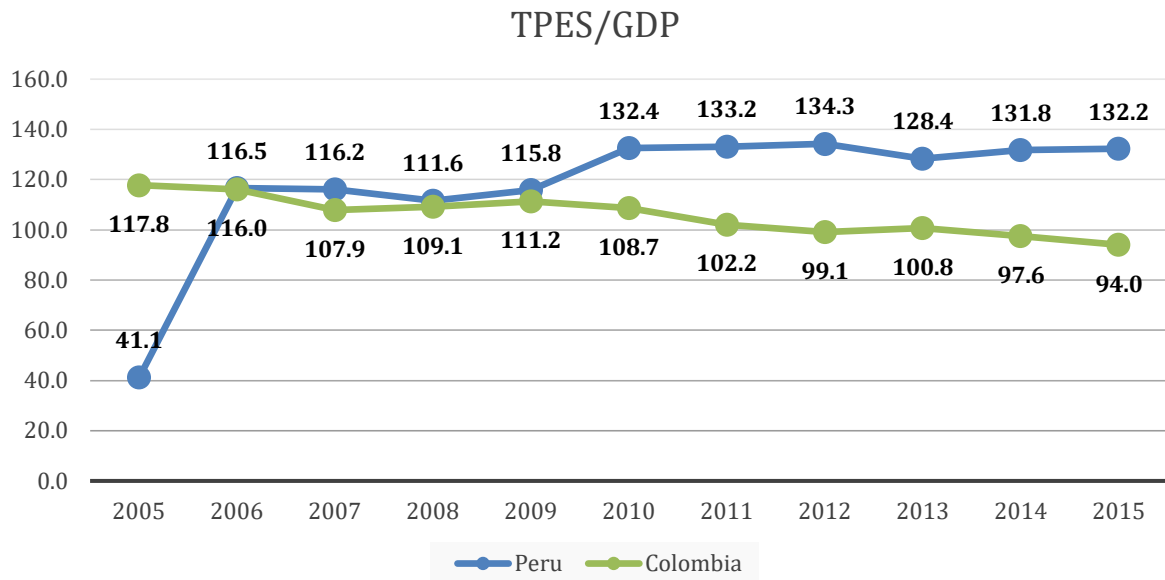
The difference in value between the two countries is due to the fact Colombia energy production is way higher than Peru's.



Graph 30 - TPES trend

TPES/GDP comparison

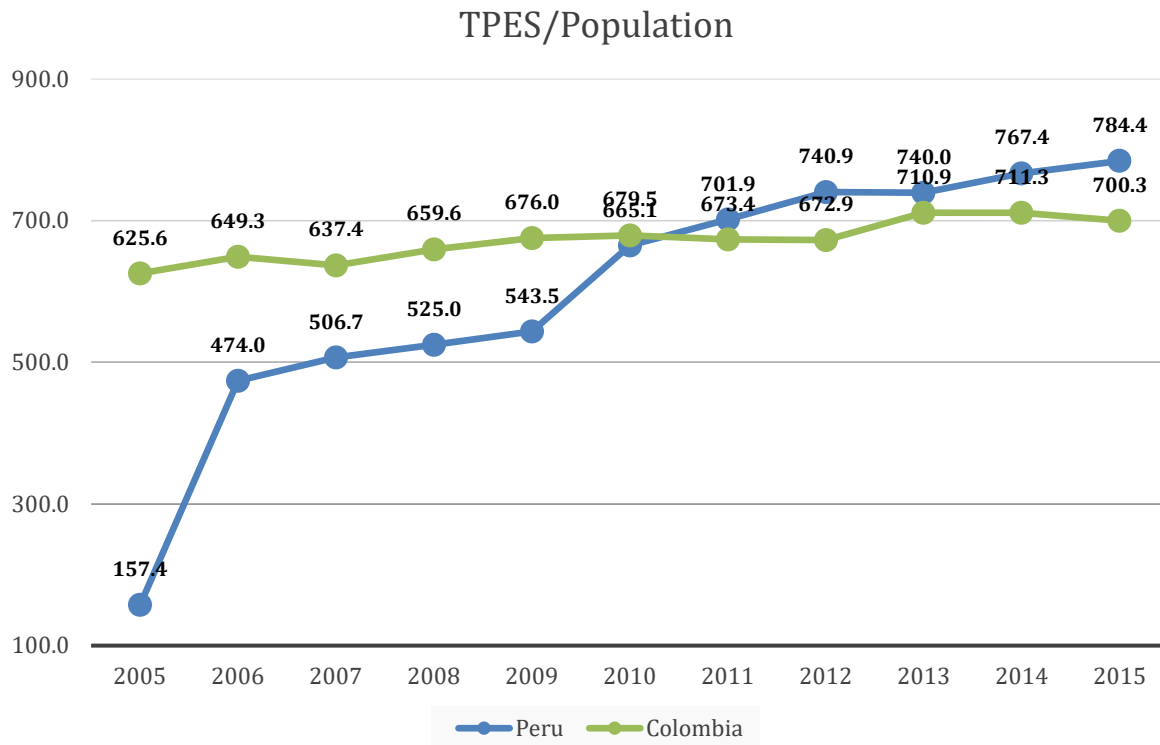
From 2005 to 2006 Peru saw a big increase of its TPES compared to its GDP; after that, apart from 2010, the tendency is pretty stable; Colombia had a more mature economy from 2005 and its GDP grew faster than its TPES. In this case the unite of measure are toe/billion USD.



Graph 31 - TPES/GDP trend

TPES/Population comparison

Exactly the same curve trend for Peru, meaning that especially in 2006 the amount of energy each person could count on was higher than 2005; Colombia on the other side has a pretty stable trend with a little increase, meaning people from 2005 to 2015 have wasted more or less the same amount of energy. The unit of measure chosen is toe/millions of people.

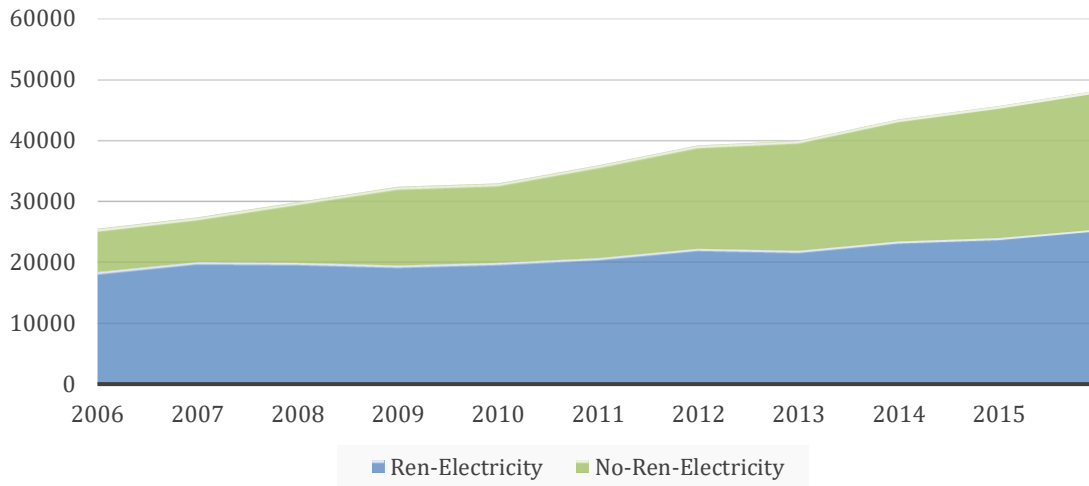


Graph 32 - TPES/Population trend

Energy renewable usage/Total energy

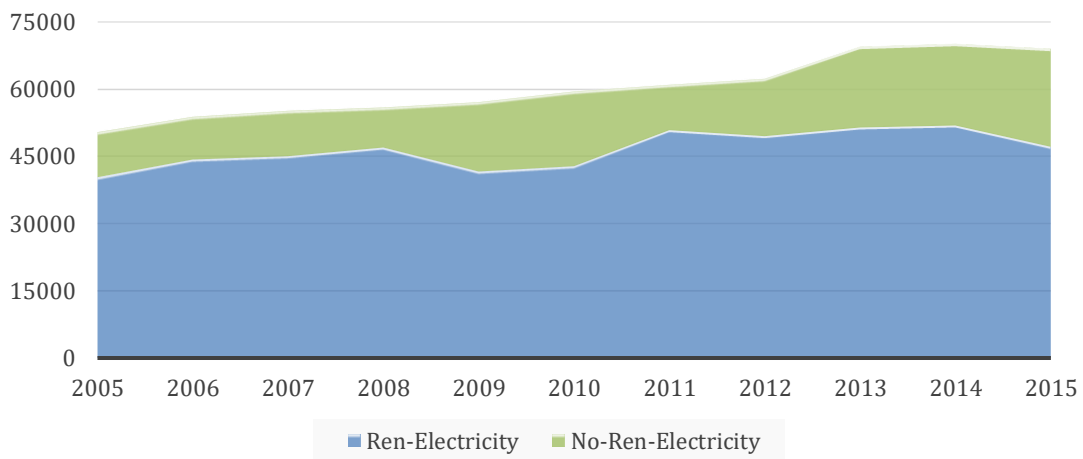
Despite the curve here is decreasing, Peru has been increasing its production of renewable energy; probably this is due to an increase in the demand for electricity. Apart from 2008 to 2010, Colombia curve has remained constant over the years. The unite of measure is Gwh/Gwh (%).

Peru electricity production

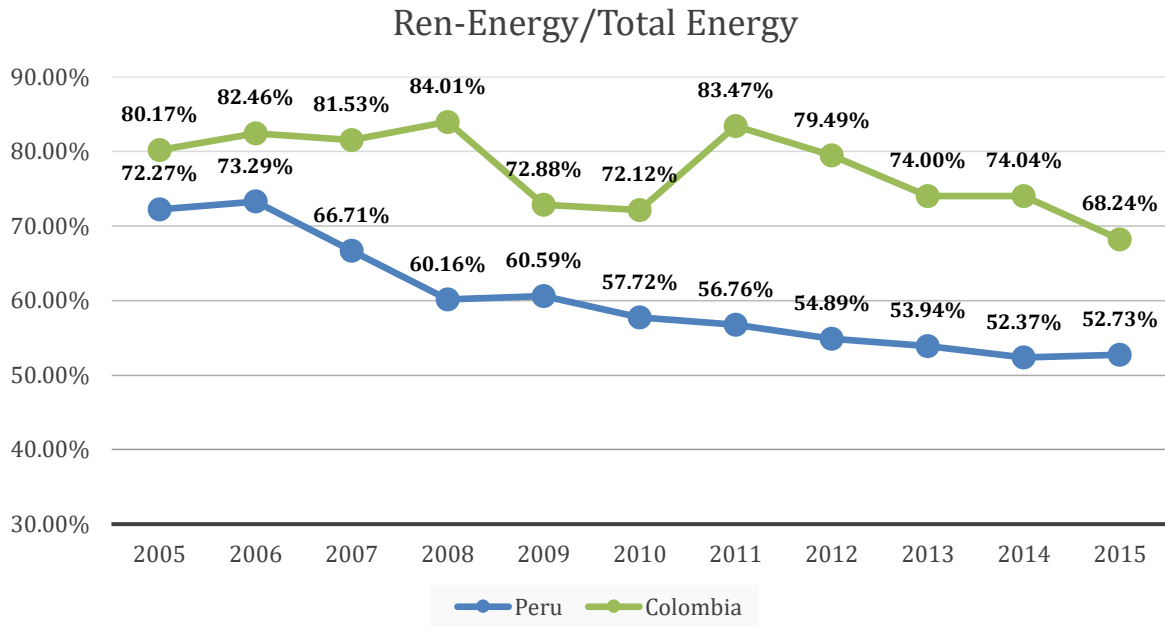


Graph 33 - Peru electricity production

Colombia electricity production



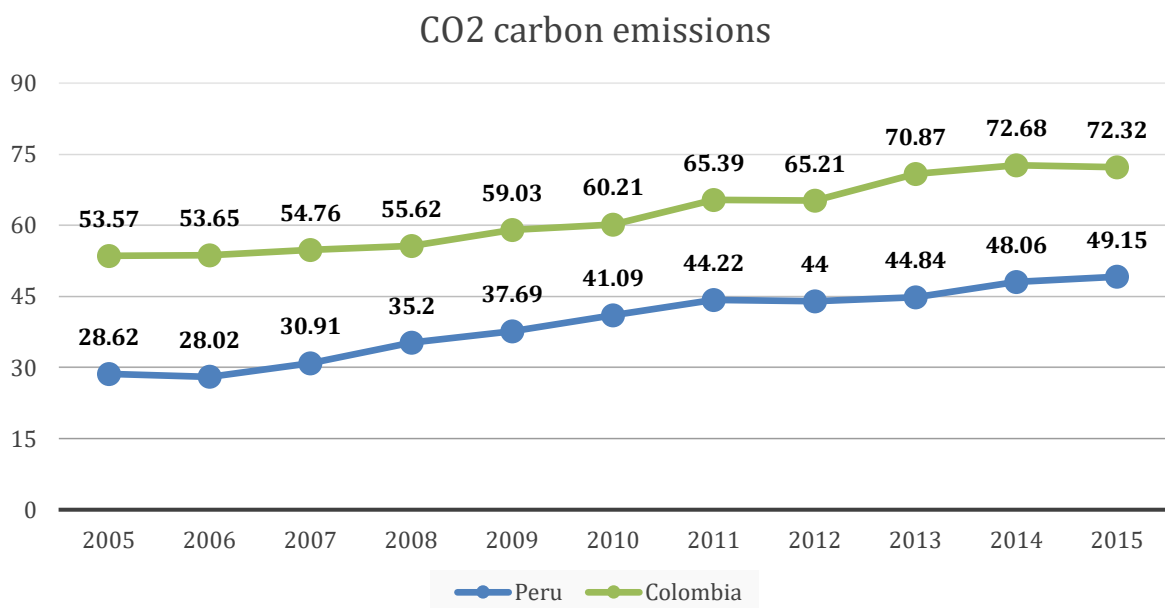
Graph 34 - Colombia electricity production



Graph 35 - Renewable energy/Total energy

Air Evaluation

As a consequence of their increasing of energy production, both of the countries are raising their CO2 emissions over the years. The difference in value is due to colombian higher energy production. The unite of measure is Mtons of CO2 despersed in the air.

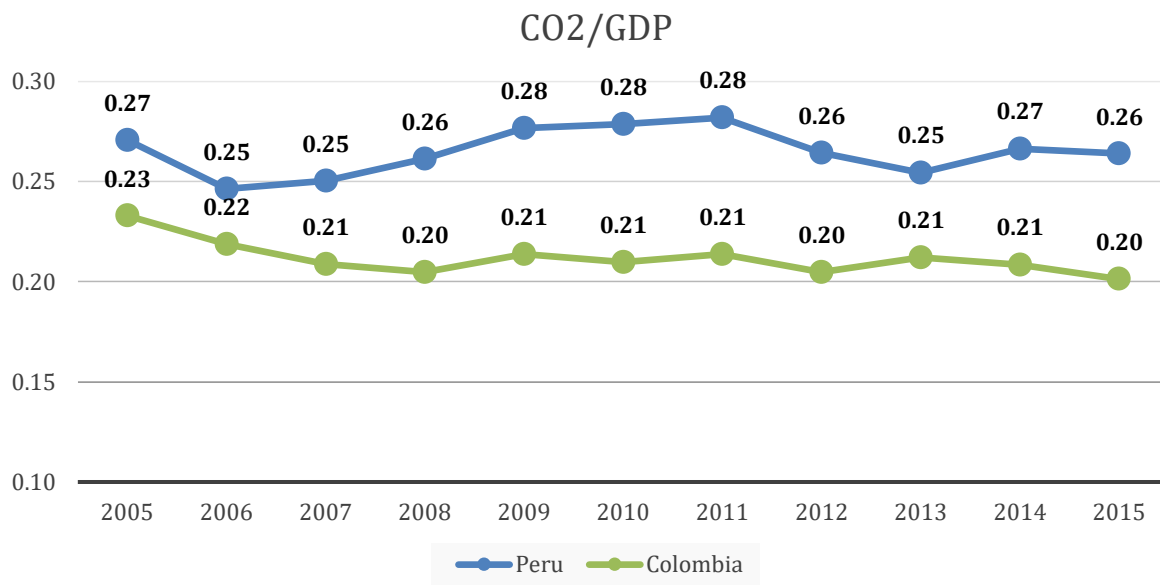


Graph 36 - CO2 emissions in air

CO2 emissions/GDP

In Colombia an increase of GDP has not meant a faster increase of emissions during the last ten years, following an overall decreasing that mean a positive result.

Peru knew an important increase till 2011 and then a big decrease till 2013, with the final result of a stable value if we compare 2015 with 2005. The unite of measure used is Mtons of CO2/billion USD.

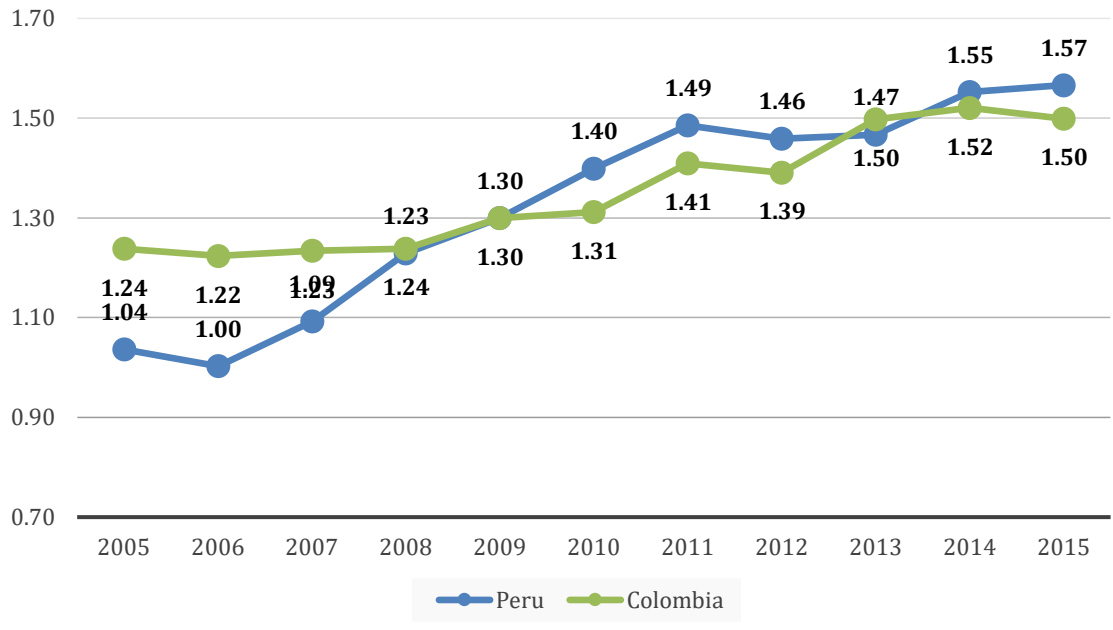


Graph 37 - CO2/GDP trend

CO2 emissions/Population

The starting point of Colombia was higher as previously explained; then Peru knew a faster grow with a balance in 2009; both of them are overall increasing but Peru emissions keep increasing costantly and faster than its population, meaning that in percentage a raise of its population involve a not proportioned increase of CO2 emissions. The unite of measure used are Mtons of CO2/millions of people.

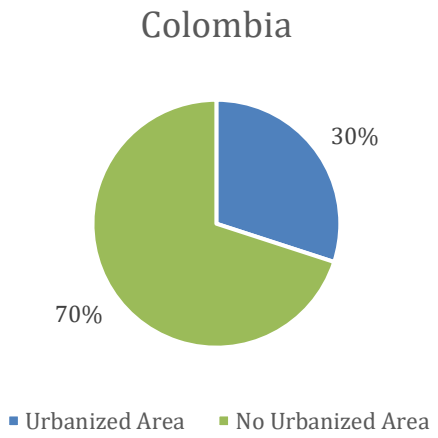
CO2/Population



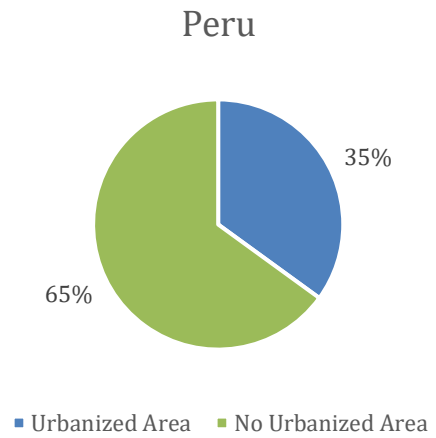
Graph 38 - CO2/Population trend

Soil Evaluation

In order to give an idea of total urbanized surface, the graphs below represent a the percentace of land urbinezed and the percentage where it is not possile for people to live.



Graph 39 – Colombia urbanization



Graph 40 - Peru urbanizatio

Annex B

Following are reported all the table related to the qualitative analysis of practical cases.

	Practical case/company name	Context definition		
		Settore	Area geografica	Prodotto
Colombian cases	Socya	Chemical industry	Colombia	oil
	Cementos argos	Cement industry	Colombia	cement
	D'cada	Drink industry	Colombia	juice
	Ecoil	Chemical industry	Colombia	oil
	Smurfit Kappa	Chemical industry	Colombia	paper
	Grupo nutresa	Food industry	Colombia	food
	Grupo nutresa	Food industry	Colombia	food
	Grupo nutresa	Food industry	Colombia	food
Peruan cases	Re-use of banana "cascara"	Food Industry	Peru	Bags
	Faber Castell	Stacinery Indusytry	Peru	Pens
	Integrated Water Resources Management in Peru	Utilities industry	Peru	Water
	"Agua para todos"	Utilities industry	Peru	Water
	Briquettes	Fuel Industry	Peru	bags

Table 21 - Practical cases context analysis

Practical case/company name	Stakeholder Analysis				
	Internal		External		
	Employees	Shareholders	Supplier and distributors	Public	
Colombian cases	Socya	Chemical industry employees	Socya shareholders	The company itself	Local community
	Cementos argos	Cement industry employees	Cementos argos shareholders	The company itself	Local community
	D'cada	Bottle collector	D'Cada shareholders	The company itself	Local community and shoppers
	Ecoil	family members	The founders of the company	The company itself	the population
	Smurfit Kappa	every worker	company shareholders	The company itself	the country as a whole
	Grupo nutresa	only the ones in this part of the supply chain	company and suppliers	specific product suppliers	Local community and country
	Grupo nutresa	research and development	company shareholdes	None	All comunities hosting each actors of the value chain
	Grupo nutresa	research and development	company shareholders	disposal company	Hosting community of such company
	Re-use of banana "cascara"	Food industry employee	Universidad de Piura	The company itself	Local community
Peruan cases	Faber Castell	Low specialized workes (majority women)	Faber Castell	Plastic companies, European logistic providers, Local logistic providers, Ink suppliers	Local community
	Integrated Water Resources Management in Peru	Low specialized workes (majority women)	Universidad de Piura	Tubs constructors	Local community
	"Agua para todos"	Low specialized workes	Universidad de Piura	Tubs constructors	Local community
	Briquettes	Low specialized workes	Universidad de Piura	Pallets manufacturers, Local logistic provide	Local community

Table 22 - Practical cases stakeholder analysis

Practical case/company name	Value chain definition		
	Input	Activities	Output
Socya	Used oil collected from restaurants	sell it to biodiesel producers	biodiesel produced with part of ingredients recycled
Cementos argos	Empty and used sacks of cement	sell them to shindles producers	shindles produced with remanufactured material
D'cada	Empty plastic bottle after drinking juice	Recollect bottles from shops and sell to recycling companies	new products produced by reusing plastic bates
Ecoil	used oil from vegetables	Transform it in animal food, cleaning products and	brand new products totally produced from recycled oil
Colombian cases Smurfit Kappa	both new fibers and recycled ones	They produced products based on fiber coming from wood or recycled p	production where paper wastes are reinsert in the production process of the product
Grupo nutresa	New and recycled material for packaging	The new packaging is produced for the 74% for recycled materials of different types	A product made for the majority with recycled materials and with same quality
Grupo nutresa	New and innovative eco-design	A methodology called DTV (diseno para crear valor) is used for	222 tons less used for packaging production
Grupo nutresa	A new and innovative plan for furniture recycling	Reutilization of such difficult to recycle furniture with small remanufacturing operations	New and cheap furniture for public schools
Re-use of banana "cascara"	"Banana Cascara"	Reuse the babana cascara treating it with different polymers in order to obtain a mass suffeciently strong to create diches or	Small bags which can be used in supermarkets
Faber Castell	Plastic, ink, polumer, gum	Recycling of all plastic coming from westes of packaging proceses	Reuse of plastic waste of pens to be melted and reprocessed in the same production cycle or used for production
Peruan cases Integrated Water Resources			
Management in Peru	Water, infrastructures	Allowing the accesibility of free water for poor community	Water infrustructure able to satisfy community needs
"Agua para todos"	Water, infrastructures	Allowing the accesibility of free water for poor community	Water infrustructure able to satisfy community needs
Briquettes	Used pallets	Reuse pallets wood to create briquettes which are a different way to create combustion for cooking and heating	Low cost briquette which can be used by local communities

Table 23 - Practical case value chain

Practical case/company name	Impact description		
	Environmental	Social	Economical
Socya	decreased in biodiesel production	increase of community health condition	Save money of the community from not disposing such used oil
Cementos argos	decrease while producing shingle and when disposing wastes	increase of community health condition	Give the community the possibility to buy shingles at a lower price and save money from material disposal
D'cada	coming from a decreasing of plastic disposal and production	health condition improved and example for next generations	great cut in disposal costs and more profits deriving from the improved image
Ecoil	reduced due to reduction of raw material extraction	Community does not have to deal with a difficult product to dispose and really polluting	company strongly cut costs for raw materials to be used for product production
Smurfit Kappa	strongly diminished as they replant in Colombia exactly the same number of trees they use	the quality of the air is much better, benefiting the Colombian population	reintroducing recycled fibers they have the possibility to cut raw materials cost and first fabrication
Grupo Nutresa	quite reduced as the manufacture of raw material diminishes	higher health standard for community and training for suppliers	huge cut on raw materials purchase and more income for small and sustainable suppliers
Grupo Nutresa	reduced due to reduction of raw material used and manufactured	Each community hosting a company of each stage of value chain recorded higher quality of air	reduction of cost at each stage of value chain, with each of them creating more value
Grupo Nutresa	As this material would be really difficult to recycle the impact is really positive	Public schools will have new furniture for very low price, improving the quality of the service	Such company save a big amount of money due to the difficulty to recycle or dispose this product
Re-use of banana "cascara"	Decrease pollution due to reuse of part of production and less plastic production	Potential new job opportunity	Safe disposal money
Faber Castell	Less plastic production	Potential new job opportunity	Safe disposal money
Integrated Water Resources Management in Peru	None	Reach the most poor community reaching the accessibility to water	Safe disposal money
"Agua para todos"	Use of renewable energies	Water purification system using solar energy that has as a goal the implementation of modular and scalable solar energy plants that produces clean water for vulnerable communities.	Safe disposal money
Briquettes	decreased in biodiesel production	Poor communities can use the briquettes for cooking and heating	Safe disposal money

Table 24 - Practical case Impact analysis