



ECONOMIC IMPACT OF PROSPERITY HIGHWAYS (4G) IN THE DEPARTMENT OF ANTIOQUIA

Estefani Arango Ospina

Andrés David Delgado González

University Institution Esumer
School of International Studies
Medellín, Colombia

2016

ECONOMIC IMPACT OF PROSPERITY HIGHWAYS (4G) IN THE DEPARTMENT OF ANTIOQUIA

Estefani Arango Ospina

Andrés David Delgado González

Research paper presented to obtain the title of:

International negotiator

Tutor:

Eliana Maria Bedoya Acevedo

International Negotiator, International Logistics Specialist, Candidate Master in International
Business

Investigation line:

Economic Development Department of Antioquia

University Institution Esumer

School of International Studies

Medellín, Colombia

2016

Special Thanks

Being professional is a goal that many of us propose since we are in school, this goal can arise for different reasons, but especially the greatest desire is to provide a better life for our families and seek to overcome as human beings to be able to provide, support and promote the welfare and development of society as a general component.

But as we got deep in this long and hard road, trips give no waiting, and many of the colleagues with whom we began this steeplechase begin to falter and the group is becoming smaller. Perhaps for personal, family or in many cases economic issues many of these friends who shared the same dream are forced to give up this and decide to take a new path with new goals and purposes.

Today that dream that has cost so much effort, time and money but at the same time provides a rewarding feeling, it is increasingly real and palpable, now we are in the last stage of this this cycle to start a different life with new goals and purposes to complement our life project and draw us closer to that ideal of expected life.

Today we want to thank our families for their support, patience and given thrust, certainly without them none of this would have been possible.

Our tutor Eliana Maria Bedoya for her professionalism and always clear observations and advice.

Camilo Sanchez for guiding us through the APA rules and suggestions regarding the framework for the presentation of work.

Federico Atehortúa who gave us his vision on economic field and teacher Alicia Ines Velez who brought her knowledge in the logistic scopes.

In general to all those who were involved directly and indirectly in this project, thanks for everything.

THANK YOU!!!

Resumen

A fin de constatar la viabilidad del megaproyecto denominado Autopistas de la prosperidad en el departamento de Antioquia. Se procede a realizar un proyecto de investigación que permita determinar las condiciones del sistema vial actual, la reducción de tiempos y el efecto que puede generar dicha obra sobre la economía del departamento de Antioquia.

Se utilizan diversos mecanismos para recolectar información proveniente de fuentes primarias como son la Agencia Nacional de Infraestructura ANI y entrevistas a dos expertos colaboradores de Esumer en el campo logístico y desarrollo económico. Fuentes de segunda mano entre las cuales se encuentran la Cámara de Comercio de Medellín, el Ministerio de Transporte y demás entidades que intervienen y cooperan de manera directa e indirecta en el proyecto. Gran parte de esta información posee un carácter descriptivo y aclaratorio los cuales respaldados por el análisis desarrollado permiten evidenciar si los resultados esperados de dicha obra son consecuentes con los objetivos propuestos.

El trabajo inicia con una explicación generalizada del alcance, fases, etapas, lugar y tiempo en el cual se llevan a cabo cada una de las etapas del proyecto Autopistas de la Prosperidad; una vez contextualizado el proyecto, se enfoca especialmente en el departamento de Antioquia.

Abarca temas como las condiciones actuales de las vías del departamento de Antioquia, costo de los fletes internos actuales, costos aproximadas después de la ejecución del proyecto, matriz DOFA, reducción en los tiempos de transporte e influencia de todos estos aspectos en el desarrollo económico de Antioquia.

Dicha investigación arrojó resultados favorables tanto económicos como logísticos en cuanto a la construcción de dicho proyecto; lo cual afectará positivamente el comercio internacional del Departamento de Antioquia.

Palabras clave

Infraestructura vial, internacionalización, concesiones, transporte, Prosperidad, inversión, competitividad, topografía, movilización, distribución, Desarrollo.

Abstract

In order to determine the viability of the mega project called Highways of Prosperity in the department of Antioquia. We proceed to carry out a research project to determine the conditions of the current road system, reducing time and the effect it can generate that project on the economy of the department of Antioquia.

Various mechanisms were used to collect information from primary sources such as the Agencia Nacional de Infraestructura ANI, as well surveys with two experts Esumer partners in the logistics field and economic development. Second-hand sources such as Cámara de Comercio de Medellín, the Ministerio de Transporte and other entities involved that cooperate directly and indirectly in the project. A lot of this information has a descriptive and explanatory character which its support the analysis developed show whether the expected results of this work are consistent with the objectives.

The work begins with a general explanation of the scope, phases, stages, place and time in which is carried out each stage of the project Highways of Prosperity; once contextualized the project, it focuses especially on the department of Antioquia.

It covers issues such as current conditions of the roads in the department of Antioquia, cost of current internal freight, costs approximate after the execution of the project, matrix SWOT, reduction in transport times and influence of all these aspects in the economic development of Antioquia.

Such research presented favorable results both economic and logistical regarding the construction of the project; which will positively affect international trade in the department of Antioquia.

Keywords

Road infrastructure, internationalization, concessions, transportation, prosperity, investment, competitiveness, topography, mobilization, distribution, development.

Table of Contents

Pág.

ILLUSTRATIONS LIST	
TABLES LIST	
GRAPHICS LIST	
SYMBOLS AND ABBREVIATIONS LIST	
1. INTRODUCTION	13
2. PROJECT FORMULATION	16
2.1 BACKGROUND.....	16
2.2 STATE OF THE ART.....	17
2.2.1 <i>Low Competitiveness Infrastructure</i>	18
2.2.2 <i>Antioquia Concessions</i>	22
2.2.3 <i>Reduction in transport times</i>	30
2.2.4 <i>Employment Generation</i>	31
2.2.5 <i>Schedule of Activities</i>	31
2.3 PROBLEM APPROACH	32
2.4 JUSTIFICATION	34
2.5 OBJECTIVES.....	36
2.5.1 <i>General Objective</i>	36
2.5.2 <i>Specific Objectives</i>	36
2.6 METHODOLOGICAL FRAME.....	37
2.6.1 <i>Method</i>	37
2.6.2 <i>Methodology</i>	38
2.7 TARGETS	39
3. EXECUTION OF THE PROJECT.....	40
3.1 THE DEVELOPMENT OF A REGION IS INFLUENCED BY THE STATUS OF ITS ROADS	40
3.2 CURRENT STATE OF INFRASTRUCTURE IN ANTIOQUIA.....	42
3.3 CURRENT COSTS OF ROAD TRANSPORT IN ANTIOQUIA	45
3.4 REDUCTION IN FREIGHT TIMES.....	48
3.5 REDUCTION OF TRANSPORTATION COST IN ANTIOQUIA.....	51
3.6 WHY BUILD HIGHWAYS OF PROSPERITY?.....	54
4. EVALUATING FACTS.....	57
5. CONCLUSIONS AND RECOMMENDATIONS	59
5.1 CONCLUSIONS	59
5.2 RECOMMENDATIONS	60
6. REFERENCES.....	62
7. ATTACHMENT	65

Illustrations List

	PÁG.
<i>Illustration 1. Current Road Infrastructure Network and The New Concessions.....</i>	<i>21</i>
<i>Illustration 2. Concessions of Antioquia.....</i>	<i>23</i>
<i>Illustration 3. North Highway Connection.....</i>	<i>25</i>
<i>Illustration 4. Magdalena Highway 2.....</i>	<i>26</i>
<i>Illustration 5. Pacific Highway Connection 1.....</i>	<i>27</i>
<i>Illustration 6. Pacific Connection 2.....</i>	<i>28</i>
<i>Illustration 7. Pacific Connection 3.....</i>	<i>29</i>

Tables List

	PÁG.
<i>Table 1. Concessions to develop in Antioquia</i>	<i>24</i>
<i>Table 2. Estimated Reduction Time</i>	<i>30</i>
<i>Table 3. Employment Generation.....</i>	<i>31</i>
<i>Table 4. Road Network of Antioquia.....</i>	<i>43</i>
<i>Table 5. Freight Medellín to Santa Marta, Container 20'</i>	<i>46</i>
<i>Table 6. Freight Medellín to Barranquilla, Container 20'</i>	<i>46</i>
<i>Table 7. Freight Medellín to Cartagena. Container 20'</i>	<i>46</i>
<i>Table 8. Freight Medellín to Buenaventura, Container 20'</i>	<i>47</i>
<i>Table 9. Average Cost for International Container Shipping.....</i>	<i>48</i>
<i>Table 10. Approximate Reduction Freight.....</i>	<i>52</i>

Graphics List

	PÁG.
<i>Graphic 1. Ranking Quality of Roads.....</i>	<i>19</i>
<i>Graphic 2. Objectives for Level Investment.....</i>	<i>20</i>
<i>Graphic 3. Schedule of Activities.....</i>	<i>32</i>
<i>Graphic 4. Percentage GDP Growth in Antioquia</i>	<i>41</i>
<i>Graphic 5. Ranking Quality of Routes in Latin America.....</i>	<i>44</i>

List of Symbols and Abbreviations

ANI: Agencia Nacional de Infraestructura

BANREP: Banco de la República

BID: Banco Interamericano de Desarrollo

BM: Banco Mundial

INVIAS: Instituto Nacional de Vías

USD: American Dollar

HDM- 4: is a computer program with associated documentation, which will serve as the main tool for analysis, planning, management and evaluation of maintenance, improvement and road investment decisions.

1. Introduction

As indicated on the website In Colombia, Antioquia is a department located in the northwest of Colombia, has a land area of 63,612 km²; because of its geographical position stands out among the other departments of Colombia for its incalculable wealth in biodiversity and natural resources that gives its strategic location. (In Colombia, 2015)

Antioquia has a coast area that connects its land with the Atlantic Ocean, turning to the inner territory is crossed by ridges and mountains that give it its wealth and splendor, but that in turn become the biggest obstacle to achieving economic development and improve competitiveness internationally, more expensive mobility costs in the marketing of goods.

According to the National Infrastructure Agency (INVIAS, 2011), "Antioquia has 88.95 km paved roads per thousand km² area, while in the department of Choco paved roads do not exceed 80 km per thousand km² area" . While this sounds encouraging for Antioquia comparison, it is far below international standards. Even in less economically developed countries better conditions for the transport of goods are observed from inside the territory to seaports.

Given these conditions and the setbacks to carry out the exchange of goods effectively the idea of creating a network of interdepartmental roads denominated in the beginning as “Autopistas de la Montaña” subsequently adopted the name Highways of Prosperity internationally known as highways fourth generation 4G.

With these highways and the creation of two seaports in Antioquia it is to improve the infrastructure and internal and external competitiveness that will open the door to new strategic alliances that will promote economic and social development of the department and overall quality of life for Colombians.

In Colombia it's been done different infrastructure plans and connection between departments, but it is the first time that an ambitious expansion process covers much of the territory and brings wealth and prosperity for the general population prospects.

By the end of this development it is expected that the existing infrastructure will connect to the new concessions in an effective and practical way, facilitating interconnection between departments and streamlining the process of importing and exporting goods as fundamental processes for commercial expansion which will enforce with the new free trade agreements and those which are in the process of signing.

This, like many other issues represent a basis of vital importance for the development of international negotiator, is why it was decided to work in depth the approach of this project, the road infrastructure will be analyzed from the points of view of international negotiator: time traffic, general characteristics, coverage, costs, safety and accessibility and to determine the scope, potential advantages and disadvantages in order to find out whether the financial investment will pay off in the near future and

exceed the expectations of those who bet on realize this concession and to achieve its detractors finally accept and recognize the goodness that was always the best decision. Or conversely identify that the investment does not justify the cost of planning and execution and understand the big mistake by committing assets that provided even more benefits to the nation tan the benefits provided for this mega Project.

2. Project Formulation

2.1 Background

Highways Prosperity is a project in development that does not provide much data or statistics to evaluate its impact on the region, therefore does not have historical for making the traceability of the positive or negative consequences of the execution of a project this magnitude. However data are available from studies in macro infrastructure projects, these studies have included social, economic, environmental and statistical areas of the short, medium and long term and have shown the viability and success that these projects generate in the region where it is developed.

An example of the advantages that brings road infrastructure in economic development can be seen in Chile. An article published by the BBC (2015) states that Chile is in several categories the best in road infrastructure with a network of 77,764 km of which include 2,387 km of highways placing Chile as the best in the field of road infrastructure in Latin America followed closely by Panama, this road infrastructure grows parallel with the economy of each of these nations. The article also mentions Uruguay and Colombia as the worst of Latin America, but the most vivid example of the direct link between infrastructure and economic development of a region is seen in Haiti,

where the poorest country in the Americas has the poorest road infrastructure of the continent.

Pablo Rodriguez de Almeida (2015) head of infrastructure WEF says "Infrastructure projects involve an amount of money not considered in planning, financing, construction, operation and maintenance." Also it notes that among the administrative difficulties is the need to correctly identify which will be the demand for these infrastructure projects and clearly the choice of a financial model, either private or public.

Work table for this research is formed by two students from International Business School ESUMER 2016. This paper aims to describe the current situation of roads in Antioquia and the development achieved through these, the scope the department could reach after the development of this macro project and how it can help increase participation in the international market.

2.2 State of the Art

The project for the development of road infrastructure in Colombia, says Colombian ex President Alvaro Uribe Velez (2016), "created under his mandate (2002-2010) with the collaboration of the Minister Gallego, Society of Engineers and Architects of Antioquia and the Chamber of Commerce of Medellin. " it became initially known by the name of Autopistas de la Montaña giving tribute to the department of Antioquia and the great dream of the Antioquia region during the past 50 years ended up becoming a national project. Today these dreams take form not only in Antioquia but throughout Colombia as a country in the process of internationalization that requires more each day improving infrastructure throughout the national territory.

Later during the mandate of President Juan Manuel Santos Calderon (2010-2018) the project name was changed by a divergence between regions and became to be known as "Highways of Prosperity".

2.2.1 Low Competitiveness Infrastructure

According to report of the National Infrastructure Agency (ANI, 2011) in a comparison between the infrastructure of countries, Colombia is ranked 126, just beating Venezuela that is ranked 128 and well below Ecuador ranked at position 53, it is estimated that the country owns 26% fewer road infrastructure that the one that should have to meet the targets set for the different trade agreements. The same document mentions that the percentage of GDP spent on infrastructure that does not exceed 1.5% of GDP.

According FEDESARROLLO:

A country that is in the same conditions as Colombia, should invest at least 3.1% of GDP, which should be allocated 20% for maintenance and refurbishment of existing roads and the remaining 80% for the implementation of new projects to expand the national network infrastructure and can be monitored by the national Roads Institute INVIAS. (FEDESARROLLO, 2012).

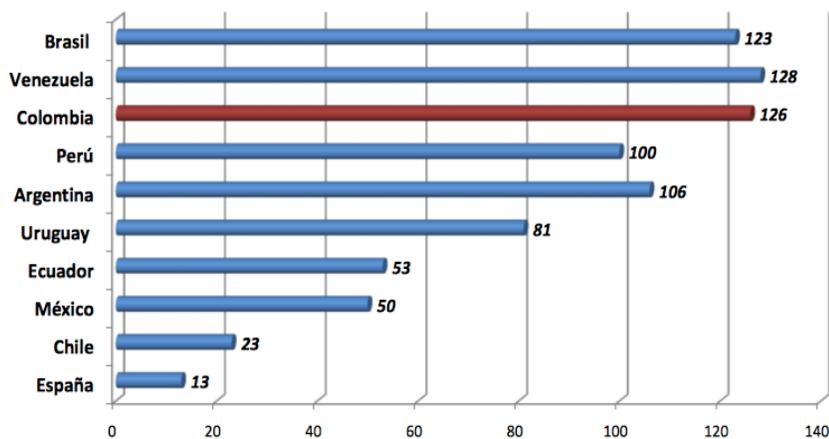
In the same study the little presence exerted by the state on the national territory is evident, it is difficult to determine the true state of national infrastructure for the lack of documentation and registration; at present the government only controls and manages the primary road network through the National Roads Institute INVIAS and has no true and accurate information on the condition of secondary and tertiary network linking urban areas and different municipalities throughout the country with the primary road

network. While these roads are under the jurisdiction of the municipalities and the mayor, it isn't right to discharge all responsibility of the maintenance process on the region, it is essential that the state supports and promotes good condition to these.

In addition to the lack of infrastructure and poor conditions in which many of the national roads are, is the rainy period which causes landslides on the roads that lead to blocking them without any contingency plan to mitigate the impact, the situation becomes chaotic for the conveyor guild.

The following chart illustrates the ranking of some countries in America and Spain. Topping the list those countries with deficits in the development of road infrastructure, the most backward Brazil, Venezuela and Colombia. In the last positions nations with the best quality and development in road infrastructure, being in the best Mexico, Chile and Spain.

Graphic 1. Ranking Quality of Roads



Source: (Andrade Moreno, 2013)

In "Prosperity Highway has qualified for five of its projects" by the national infrastructure agency ANI 1,200 km incorporate the prosperity Highways, from the

border with Ecuador to the Caribbean coast, this corridor is connected with 8,170 km of built road which will also address improvement with an estimated value of 43.9 billion pesos. (ANI National Infrastructure Agency, 2015)

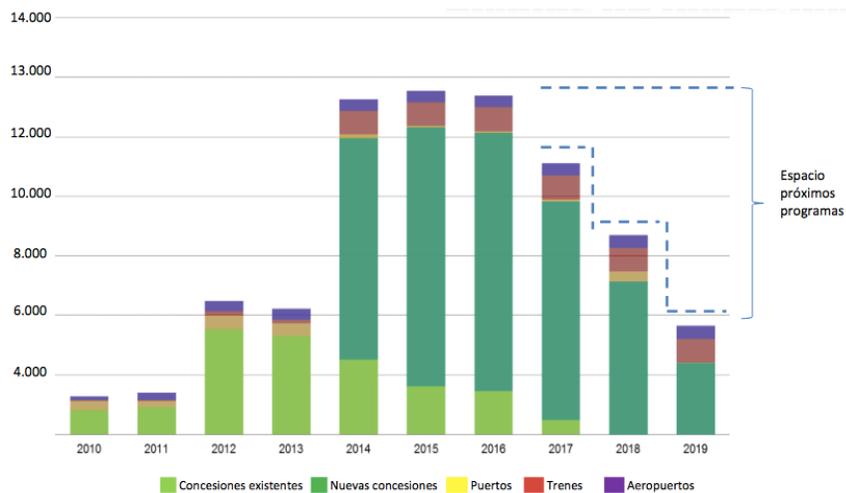
Luis Fernando Andrade Moreno president of the national infrastructure agency ANI says:

Colombia has not been given special treatment in road infrastructure development on the other hand has been underestimated and given priority and privileges to other sectors that have been left with much of the budget for development projects that benefit the community. (Andrade Moreno, 2013).

However, this condition has been gradually changing and the budget has focused more on the implementation of new concessions peaking in 2015 and continuing the trend in the next 5 years; period in which it is estimated the entire project will be completed.

In the chart below, it is shown the investment objectives from 2010 to 2019.

Graphic 2. Objectives for Level Investment

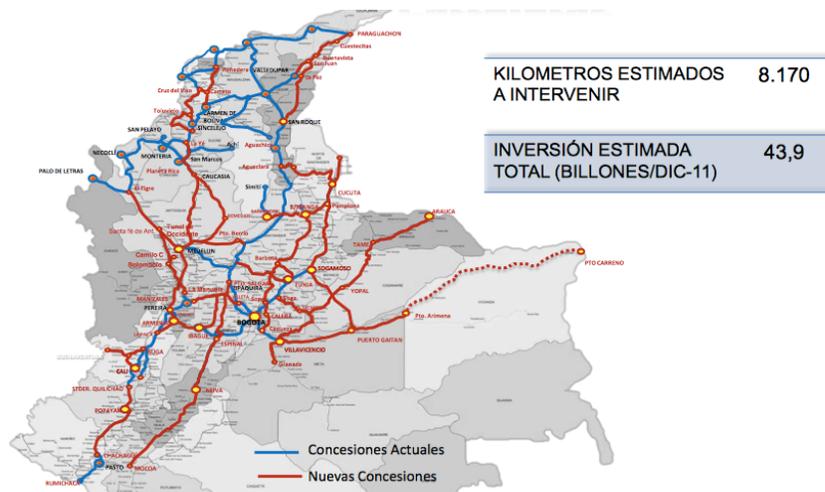


Source: (Andrade Moreno, 2013)

The National Infrastructure Agency said, "The project comprises much of northwestern territory of the country, connecting the major centers of production from south to north as the Valle del Cauca, the country's center and Antioquia, with seaports on the Caribbean coast and the Pacific Ocean, benefiting businesses and boosting prosperity of millions of Colombians. " (ANI National Infrastructure Agency, 2015)

In the image below, it is possible to appreciate the magnitude of the project, this covers much of northern territory. Current concessions that receive intervention and improvements to ensure excellent performance and red routes to be developed within the framework of Prosperity Highway. It shows that the existing roads displayed in blue will almost duplicate its infrastructure in the country.

Illustration 1. Current Road Infrastructure Network and The New Concessions



Source: (Andrade Moreno, 2013)

In publication of the Chamber of Commerce of Medellin (2013) Highways of Prosperity interconnect the south, the Valle del Cauca, Cauca, and Antioquia with: The Atlantic coast, the East, the West, the Caribbean Sea and Central America.

2.2.2 Antioquia Concessions

In an article published by the newspaper El Colombiano (2015), the 5 concessions to be developed in the department of Antioquia and known as Prosperity Highways are part of a total of eight concessions willing to interconnect departments and facilitate the exit and entry of goods into the national territory. From that 8 stages, 5 are developed in Antioquia, the northern connection comprising the Magdalena-Caucasia and Magdalena-Puerto Berrío corridor between its schedule of activities is the dredging of Magdalena River to try to recover its navigability and use it as alternate route for transport of passengers and goods. In Caucasia mar1 will connect with mar2 and this two will connect with the Northeast area of the department with the Urabá region. This stage of Highways of Prosperity project has an estimated duration of 4 years and an investment of 980,000 million Colombian pesos meeting in Antioquia territory the Bajo Cauca regions, the Northeast and the Middle Magdalena. Socially this stretch of Highways of Prosperity will be able to generate about 4000 jobs for people living in the region. With the new infrastructure is estimated that the route Bogota - Montería will reduce its route from 17 hours to 9 hours per trip for a truck, the reduction achieved in transport times is approximately 47% (see Illustration 2).

Illustration 2. Concessions of Antioquia



Source: (Agencia Nacional de Infraestructura ANI, 2013)

North concession of Highways of Prosperity as report of the Chamber of Commerce of Medellín (2013) aims to develop a road network of about 1274 km in the department of Antioquia and the operation of 903 km of existing roads, with an estimated budget of 13 billion pesos which come largely from the national government, department of Antioquia, Medellín and toll collection.

In an article published by the magazine *Semana* (2015) states that the department of Antioquia will be the great beneficiary with the implementation of the Highways of Prosperity, it will receive 25% of the total investment budgeted for this

mega work, boosting local commercial market and regional, will have direct connection with the Caldas Department, the river Cauca in Bolombolo and connection to the seaport of Buenaventura.

The project will be implemented in 5 main stages, which in turn are divided into under-developments (see Table 1):

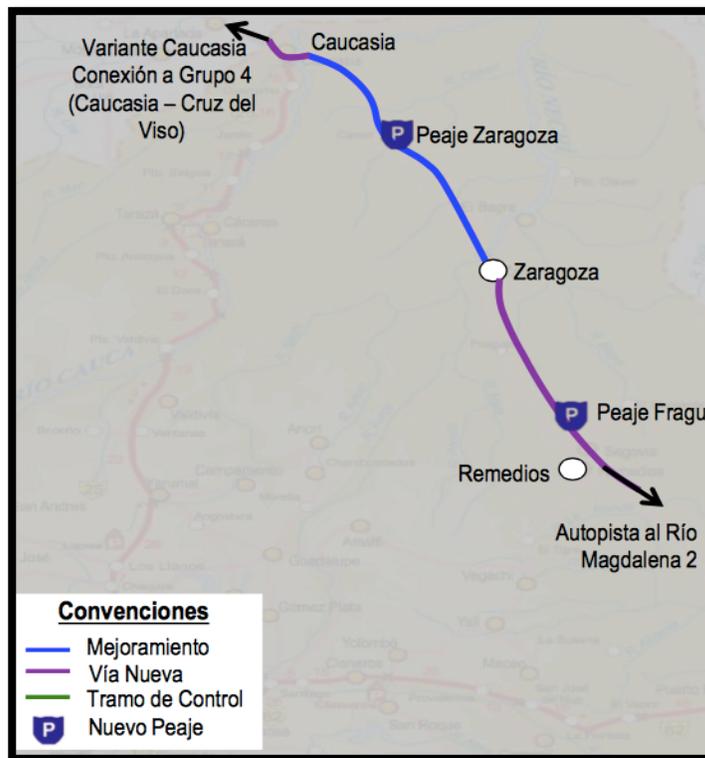
Table 1. Concessions to develop in Antioquia

STAGES	LOCATION	CORRIDORS	REACH	INVESTMENT
HIGHWAY NORTH CONNECIÓN	North East	Remedios-Zaragoza and Zaragoza-Caucasia connecting with the sun route and the caribbean coast	Construction of paths, improvements of the existing road	146 km long, investment aprox. 960.000 millions of pesos
HIGHWAY TO MAGDALENA RIVER	North West	Remedios-Alto de Dolores and Alto de Dolores-Puerto Berrío	Construction of paths, improvements of the existing road, 74 bridges and, 6 tunnels	150 km long, investment aprox. 1.32 billions of pesos
HIGHWAY PACIFIC 1 CONNECTION	South West	Ancón sur-Camilo Ce and Camilo Ce-Bolombolo	Construction of paths, improvements of the existing road, 2 tunnels, 20 bridges	46 km long, investment 1.94 billions of pesos
HIGHWAY PACIFIC 2 CONNECTION	South West	Bolombolo-La Pintada and La Pintada-Primavera	Construction of paths, improvements of the existing road, tunnel of 2.5 km and a bridge of 120 mt long over Cauca river	95 km long, investment 940.000 million of pesos
HIGHWAY PACIFIC 3 CONNECTION	South West	La Pintada-La Felisa, La Felisa-Irra, La Felisa-Asia, Asia-La Virginia, La Variante de Tesalia and el tramo Irra-Tres Puertas	Construction of paths, improvements of the existing road, 26 bridges y 3 tunnels	231 km long, investment 1.18 billions of pesos

Source: own construction based on: (Andrade Moreno, 2013)

2.2.2.1 North Highway Connection

Illustration 3. North Highway Connection



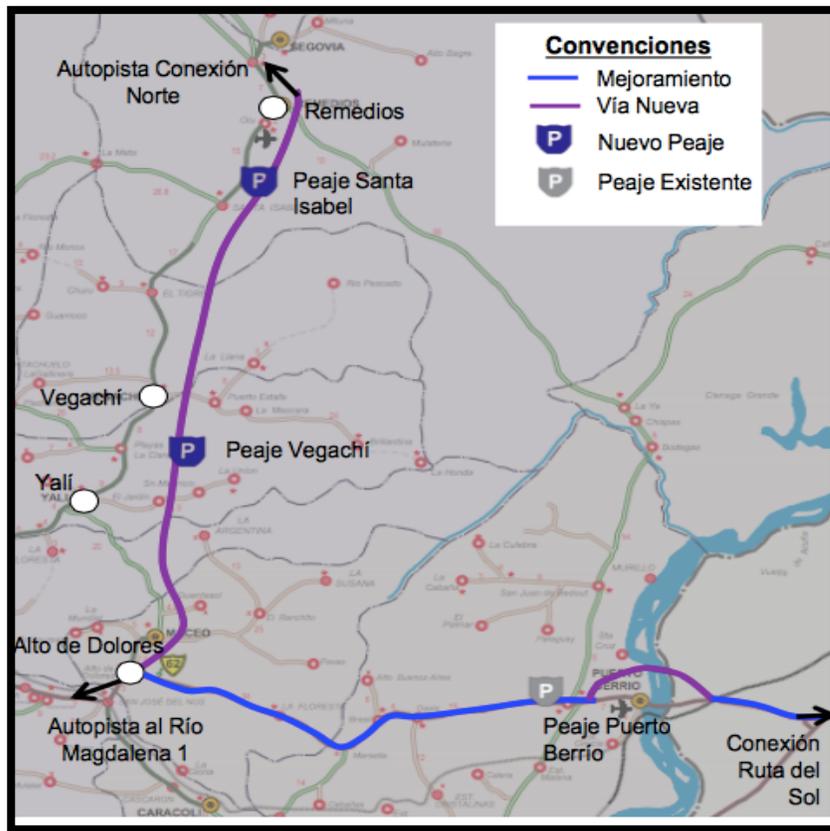
Source: (Andrade Moreno, 2013)

According to the newspaper El Colombiano publication (2016), the northern connection comprises the intervention of the municipalities of Remedios, Cauca and Zaragoza seeks to connect the southwest and west central directly with the seaport of Cartagena. The work would reach an average investment of 0.96 billion pesos and generate approximately 5,000 jobs for the population of the region. A construction period of 4 years comprising 36 bridges, five tunnels and 93 bridges is estimated. it will intervene and maintain approximately 146 km of roads.

According to Luis Fernando Andrade, president of the National Agency Road Infrastructure ANI northern connection will become one of the most important roads in the country, improve the competitiveness of the Caribbean, Antioquia Coast and the center of the country and once completed it will connect with Magdalena 2 and the concession Ruta del Sol and the Atlantic Coast Highway.

2.2.2.2 Motorways to Magdalena River 2

Illustration 4. Magdalena Highway 2



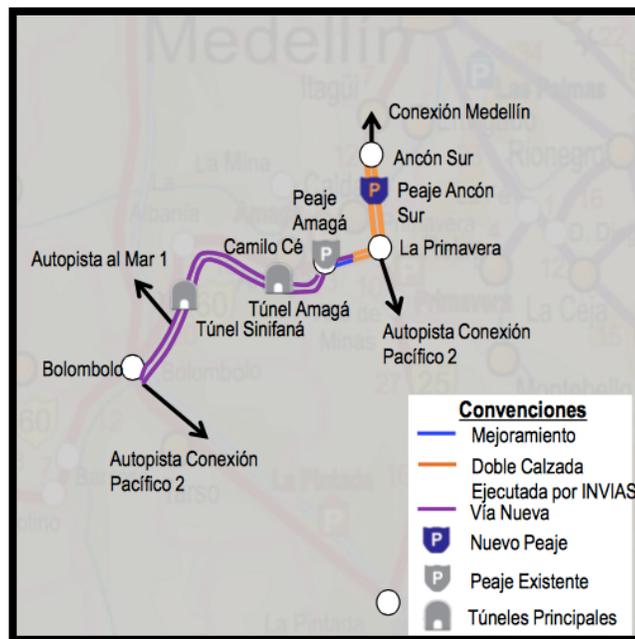
Source: (Andrade Moreno, 2013)

The national infrastructure agency ANI (2015) reports that the corridor Magdalena Highway 2 promises to connect the department of Antioquia with Bogotá, the Magdalena Medio region, the Atlantic Coast, the Urabá region and Caldas departments, also it will connect with the Ruta del Sol promising to be one of the most important concessions throughout development. This corridor promises to generate at least 4,300 jobs that will benefit residents of the municipalities involved.

The scope of this corridor is to maintain, to intervene and operate about 150 km, which include six tunnels and 74 bridges with an estimated 1.32 trillion pesos investment.

2.2.2.3 Pacific Highway Connection 1

Illustration 5. Pacific Highway Connection 1



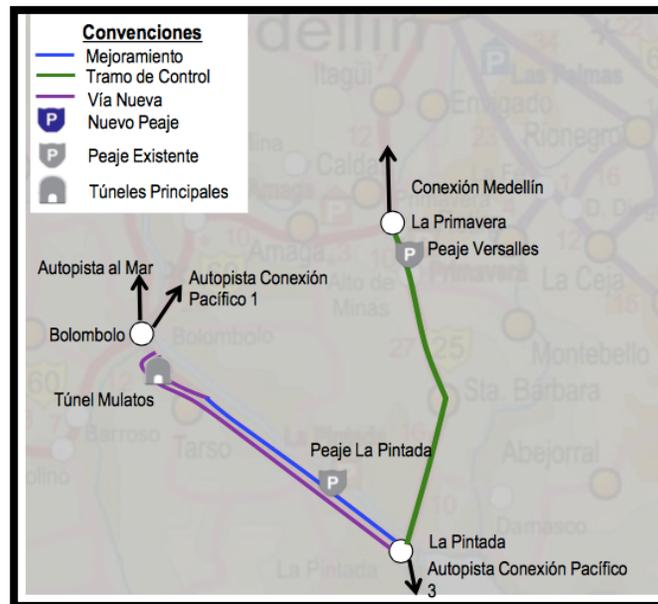
Source: (Andrade Moreno, 2013)

According to information of the newspaper La Patria (2014), the Pacific connection 1 comprises the corridor Amagá-Bolombolo, both municipalities of Antioquia, the estimated investment includes the construction of 20 bridges and two double tunnels one in Amagá and the other in Sinifaná, as well as a vial Exchange in Camilocé to continue on the road to Bolombolo, its construction is estimated to take 5 years, should be ready by 2020. Among its benefits is the reduction in travel time by increasing speed levels, it is estimated that 5-axis truck in the Medellin-Buenaventura route can make this journey in 8 hours, which currently takes 15 hours to complete its route this means an approximate 47% reduction in travel time.

An investment of 1.94 billion pesos is estimated to intervene 26 km of existing roads, operation and maintenance of 46 km of the new concession.

2.2.2.4 Pacific Connection 2

Illustration 6. Pacific Connection 2



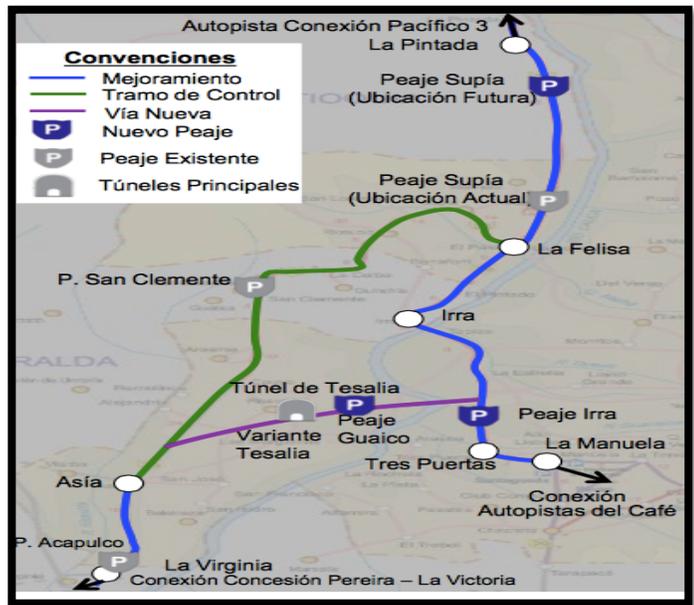
Fuente: (Andrade Moreno, 2013)

According to the portal La Pintada Concession (2015), the Pacific connection 2 is located in the department of Antioquia, in conjunction with Pacific1 and Pacific 3 will connect the centers of raw material and production to the north of the country in Magdalena, Atlántico, Bolivar, Cordoba, Sucre and Antioquia with the coffee region, Valle del Cauca and the Pacific. It promises to be the most important corridor of the Highways of prosperity marketing and facilitating the exchange of goods between regions and outward. It is expected to reduce travel time is approximately 25% and is estimated to generate about 4,800 direct and indirect jobs.

The investment of this concession is estimated at 0.94 billion pesos that will be used in the construction of 1 tunnel, 33 bridges and the operation and maintenance of 95 km as well as the intervention of 41 km of existing roads.

2.2.2.5 Pacific Connection 3

Illustration 7. Pacific Connection 3



Source: (Andrade Moreno, 2013)

According to the newspaper La Patria (2014) the Pacific Connection 3 is located in the department of Antioquia connecting it with the coffee region and reducing travel time from Medellin to Manizales just 2 hours. Its approximate investment of 1.18 billion pesos for the construction of 3 tunnels and 26 bridges.

It is intended to intervene 143.5 km of existing roads and maintain and operate around 231.5 km that will generate around 6,800 jobs for the inhabitants of the region.

2.2.3 Reduction in transport times

Minimization in transport times will be drastic and significant. According to the Chamber of Commerce of Medellin (2013), Highways of Prosperity focused on Antioquia improve the competitiveness of the industry by the reduction in transit time the vast majority are so significant that they reach a minimum of 25 % and up to 60%.

Table 2. Estimated Reduction Time

MEDELLÍN - PUERTO VALDIVIA - CARTAGENA	MEDELLÍN - CALI
24 HRS - 18 HRS	15HRS - 8 HRS
25%	47%
MEDELLÍN - RUTA DEL SOL	MEDELLÍN - URABÁ
6HRS - 4 HRS.	10 HRS - 4HRS
33%	60%

Source: Own construction based on: (Andrade Moreno, 2013)

2.2.4 Employment Generation

Socially this development will be a great source for creating direct and indirect jobs over the next few years that will benefit the population directly involved in areas where corridor will go across.

According to data from the Chamber of Commerce of Medellin (2013) the mega project would generate about 15,250 direct jobs per year and 45,750 indirect jobs for a total of 61,000 jobs a year they will have preference for people living in the areas to intervene. (Márquez, 2011).

Table 3. Employment Generation

45.750 INDIRECT JOBS/ ANNUAL				
15.250 DIRECT JOBS/ ANNUAL				
NORTH CONNECTION	MAGDALENA RIVER	PACIFIC 1	PACIFIC 2	PACIFIC 3
2.300	3.200	4.650	2.250	2.850
15.250				

Source: Own construction based on: (Andrade Moreno, 2013)

2.2.5 Schedule of Activities

The Schedule estimated for the development of the Highways of Prosperity will be completed in 25 years divided into four stages preparation, pre-construction, construction and management phase, starting in 2013 and ending in 2038.

Graphic 3. Schedule of Activities

Source: Own construction based on: (Andrade Moreno, 2013)

Preparation: From December 2013 includes the signing of the contract and start signing the home record.

Pre Construction: From Jan 2014 - Jan 2015 includes financial closure, environmental licenses, property taxes and social management.

Construction: From Jan 2015 - Jan 2020 includes to execute the Project and its stages.

Management: From Jan. 2020 - Dec. 2038 comprises delivery of functional units, auto payment, administration and maintenance and the end of the contract.

2.3 Problem Approach

With the advent of globalization, the economic environment to Colombia and the Department of Antioquia, have made significant changes in recent years. The continuous increase of entry and exit of products and services as well as tourism have enhanced importance in the development of road infrastructure. It is through these roads that made possible the exit and entry of goods produced within the country where the secondary sector is located almost entirely. If it were not for the roads it would be

impossible for Colombia to have a free trade agreement due to lack of transport methods to take the goods to the seaports which nowadays it is only possible by road transport. While Colombia as a nation has not much developed its industry, the primary sector has become the main protagonist of exports especially coal and oil.

By increasing exports and imports with the entry into force of the trade agreements signed in recent years, it has become clear that the country's road infrastructure is inefficient and has lagged compared with trade liberalization achieved with countries with which they have signed such agreements.

Then comes the need to renew and improve existing infrastructure and plan and execute a new network that integrates the regions but that in turn facilitate and reduce transit times to the most important seaports either to the Pacific and to the Atlantic and thus to improve the country's competitiveness by reducing costs of domestic freight department. the idea of a macro project known as Highways of Prosperity focusing in the department of Antioquia. This project promises to reduce transport times and approximation of regions with a national network of motorways internationally known as fourth-generation highways.

But will this project be the solution to the infrastructure problems facing by the country?. By 2020 when delivering this network of highways fourth generation will be made and put into operation to the service of globalization, an improvement will be evident in time for the internal displacement of load facilitating trade relations with outside?, noticeably decrease the inland freight in the Antioquia department to the different seaports of the country compared to the costs that must now take ?.

It is uncertain whether this project will provide economic development and social desired, however this mega work is already underway and funds have been allocated to subsidize its production.

2.4 Justification

According to the Diagnostic Report Current Road Infrastructure in Colombia:

In Colombia cargo transport is predominantly develops by road, with a share of around 80%, followed by 15% rail and waterways 6%. On the other hand, on international trade predominates cargo displacement through seaports with a share of 95% followed by air with just 4% and 1% through land borders. (Zamora Fandiño, 2012).

The data described above realize the importance of road transport has had in the history of Colombia. Mentioned this background Colombia should be able to provide a quick and effective solution to the atypical problem encountered when developing their most important centers of production in the department of Antioquia, and should also handle contingency plans to mitigate the negative impacts that brings the rainy seasons.

Unfortunately this does not happen often and the economic situations unable to fulfill and satisfy the requirements that the international market demands. Often they landslides or stoppages of different kinds that block the main primary routes connecting production centers of Antioquia to the costs occur, this creates chaos by blocking indeterminately some of the main corridors for road transport with the added difficulty of increasing transport times to deliver satisfactorily to the final consumer. This will eventually end up disadvantaging the country's competitiveness internationally.

Another compelling reason necessitating the restructuring and optimization and maintenance of road infrastructure in the country is the increase of the fleet has grown steadily in recent decades. There are more cars traveling through a road and these suffer deterioration settlement and therefore maintenance should be directly proportional to the flow of cars traveling through them. Without an optimal maintenance of this infrastructure becomes difficult to guarantee secure conditions for cargo and much less for the tourism sector.

Antioquia by its geographical position which places in the tropics more precisely in the Andean region of South America, with a variety of climates throughout the year that provide an immeasurable wealth of biodiversity and natural resources in general, it is surrounded by lush mountains that have not been the best ally for economic development department, as its topography increases transport time, the roads require high maintenance costs for higher rates of cracking. To this we add that the vast majority of primary roads around the mountains to cross from one side to another, rather than through the mountain at its base through the tunnel construction. Climbing the humps allow increases costs for the transporter due to truck spoilage with the result of a high price that the customer has to pay to obtain its goods.

Prosperity highways includes a wide labor supply that would promote the economic development of the north central part of the country. Providing a total of approximately 61,000 jobs a year that can only be occupied by residents of the region to intervene. According to numbers (Márquez, 2011)

This research is an important character because it compares the current situation in the country with other countries in similar conditions to those of Colombia highlighting a flaw occurs in the development of its road infrastructure affecting both transport times

and thus the competitiveness of the country and the department internationally. the drastic reduction in transport times will be demonstrated from the center of the department to major seaports and its positive effect on reducing logistics costs as well as their social contribution.

Studies for the implementation of Highways of Prosperity were conducted by the Chamber of Commerce of Medellin, National Infrastructure Agency (ANI), Ministry of Transport among other entities involved in the planning stage. According to these studies, it was determined that it is a viable project that would bring rural areas to primary centers, ports and cities of the country which should be executed in the shortest possible time promising economic and social development of the regions directly involved.

2.5 Objectives

2.5.1 General Objective

Analyze the impact of the project “Highways of Prosperity” and its effects on the development of international trade for the department of Antioquia.

2.5.2 Specific Objectives

Determine the current conditions of the infrastructure of the roads in Antioquia and how this affects the competitiveness of the department.

Evaluate how reducing the times of transportation, have a direct influence in the decreasing domestic freight in the department of Antioquia.

Identify whether the improvement of the road infrastructure, along with reducing transportation times and domestic freight, can improve the competitiveness of the department.

2.6 Methodological Frame

2.6.1 Method

Compiling the analysis of the project, this investigation is based in a descriptive and explanatory method; we can say that is descriptive because it wants to show the current status of the road system in Colombia in particular the department of Antioquia. Its said to be explanatory because seeks to determine the effects and consequences that generate the execution of this project, in order to present an analysis of the possible consequences of the development of a project this big in the department of Antioquia and interdepartmental access and ways out.

The information requires an analysis which will be collected through different sources and official websites from different entities involved in the research and planning process, this sources are: Research Papers, Journals, Newspapers and interviews with specialists in charge of logistics areas and economy; also with the help of INVIAS (National Roads Institute) ANI (National Infrastructure Agency)and the Minister of Transportation.

2.6.2 Methodology

Initially in order to respond to the objectives, there is a need to consult primary sources such as INVIAS(National Roads Institute) responsible for modeling and planning the stages of the work, on the other hand, there is a need to take advice from an expert such is Inés Alicia Velez. Specialist in distribution Federico Atehortúa Specialist and magister in senior management, environment and economic development; with the information collected there is a need to perform an analysis and conclusions which need to be taking as a basis to meet the objectives and provide solutions to the problem. On the other hand to complement the information available is necessary a few alternative sources like data mainly obtained from official state websites and organizations responsible for development of the project, Important local and international news papers, scientific journals and research papers. As an alternative source, the databases from the Library EAFIT University and the different databases available through the platform of the University Institution ESUMER.

2.6.2.1 Information from Secondary Sources.

This part is done through different electronic media such as websites, Journals, economy and science Magazines, research in official agencies in charge of the process and development of the work as well as informative presentations from the government.

2.6.2.2 Analysis of Information

After obtaining the information, based on the history and the analysis of the current situation of the main access to the roads of the department of Antioquia and how these are related to the economic development on the recent years.

It can be determined the variables in which the department must work and improve, such as reduction in transport times, reduction of the cost of domestic freight and its impact on the current trade balance of Antioquia and how is related to the low competitive level of the department.

After the identification of these variables, is possible to determine how these aspects are linked either directly or indirectly with each other and their involvement on both positive and negative aspects for the international trade on the department of Antioquia.

Then after having clear the variables, the relationship and the effects on the departmental economy, we can identify the potential improvement and plans that can be develop in the short and long term period. In which will allow to meet the objectives and of course, to solve the problems identified.

2.7 Targets

This work seeks to identify the weakness that is present in all aspects of the logistics process for the internationalization of the production department of Antioquia. Identify variables that relate to each other and how this can generate impacts on freight for ground transport and how this development seeks to mitigate the negative impacts and increase international business operations on the department, specially influencing the development of its economy.

There are Different factors such as economic, commercial and logistical that help determine the history, problems and possible solutions to be considered.

3. Execution of the Project

3.1 The Development of a Region is Influenced by the Status of its Roads

The Bank of the Republic states that "any process that results in improving the volume of goods and services is best known as economic development" (Bank of the Republic of Colombia, 2015).

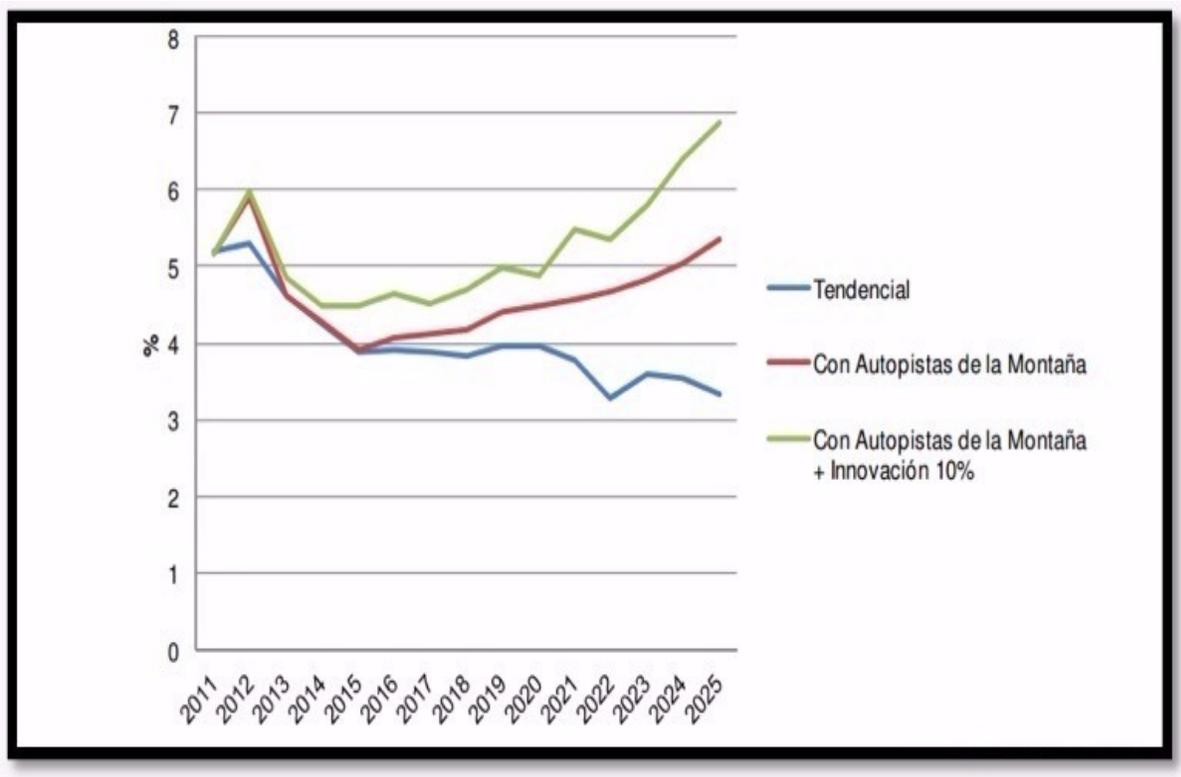
To achieve an optimum economic development on a region, different tools are needed to lead to the increase of its goods and services, one of them are roads, hydroelectric dams, bridges, airports and highways.

The economic development of a region also can be measured by their literacy rates, poverty, health coverage and access to quality education.

According to the Chamber of Commerce of Medellín, "the economic development of the region (Antioquia) in 2015 was the lowest of the decade, reaching only 3% growth, which was expected to be 5%" (Chamber of Commerce of Medellín, 2015).

However the figure is not bad it all for Antioquia, it remains in the first position of economic development between regions of the country by contributing 12% of GDP of which 8% is generated by the city of Medellin. (Bank of the Republic of Colombia, 2015).

Graphic 4. Percentage GDP Growth in Antioquia



Source: (Andrade, 2013)

According to Luis Fernando Andrade, president of the national infrastructure agency ANI in the next graphic it shows that with the construction of the Highway of Prosperity along with the implementation of science and technology to create concepts of modernization and innovation, the growth of economic development of the region can growth, generating a GDP of 5% only in the department of Antioquia. In case of not

running the project and the country maintains the road infrastructure we currently have, the economic development of the region will stay going downward with a trend of about 3%. (Andrade, 2013).

"The country has to design a road infrastructure that meets the challenges of free trade", so said Victor Gabriel Valencia Alaix, mobility expert and professor at the School of Civil Engineering, Faculty of Mines at the National University Headquarters in Medellin. Are the routes that allow the production, distribution and consumption for economic and social development property of the community? (Valencia V, 2014).

Road transport in Colombia and especially in Antioquia are the main logistics base for the optimal development of international trade in the region, facilitating the opening of new international markets. The gradual increase in cargo movement has always been considered a bellwether for the expansion and internationalization of a region outward. According to the background of the road infrastructure department backwardness in recent years it is evident and this has a direct and negative impact on the competitiveness of the department.

The department of Antioquia, as the main production center of the country, can be highly favored by the entry into force of this network of road infrastructure improved and expanded that would project further economic growth boosting its current GDP of 3.5% to 7% over the next 10 years. (Andrade, 2013).

3.2 Current State of Infrastructure in Antioquia

Data provided by the Pathways program for Integration and Equality led by the Inter - American Development Bank IDB, Antioquia has a road network of about 20,094 km, these are divided into 1,515 Km primary character of which only 91% is paved,

4,800 secondary Km of which only 18% is paved and 13,779 km would form the tertiary roads of which only 0.5% is paved, in total between all road infrastructure, Antioquia has 2,368 kilometers of paved roads equivalent 11% of the 20,094 km of roads, the remaining 17,726 kilometers are unpaved. (Huici, 2012)

The National Roads Institute INVIAS is responsible for the administration and maintenance of the primary network of Antioquia. The Ministry of Physical Infrastructure for Integration and Development of Antioquia SIF is in charge of the secondary network and the tertiary network are those that provide access to municipal capitals with their sidewalks or paths to each other, they are under the jurisdiction of each municipality, but supervised by the National Roads Institute INVIAS.

Table 4. Road Network of Antioquia

longitud (km)	pavimentada	afirmada	total
primaria	1.403	112	1.515
secundaria	892	3.908	4.800
terciaria¹	73	13.706	13.779
total	2.368	17.726	20.094

¹incluye 1.495 km a cargo de INVIAS

Source: (Huici, 2012)

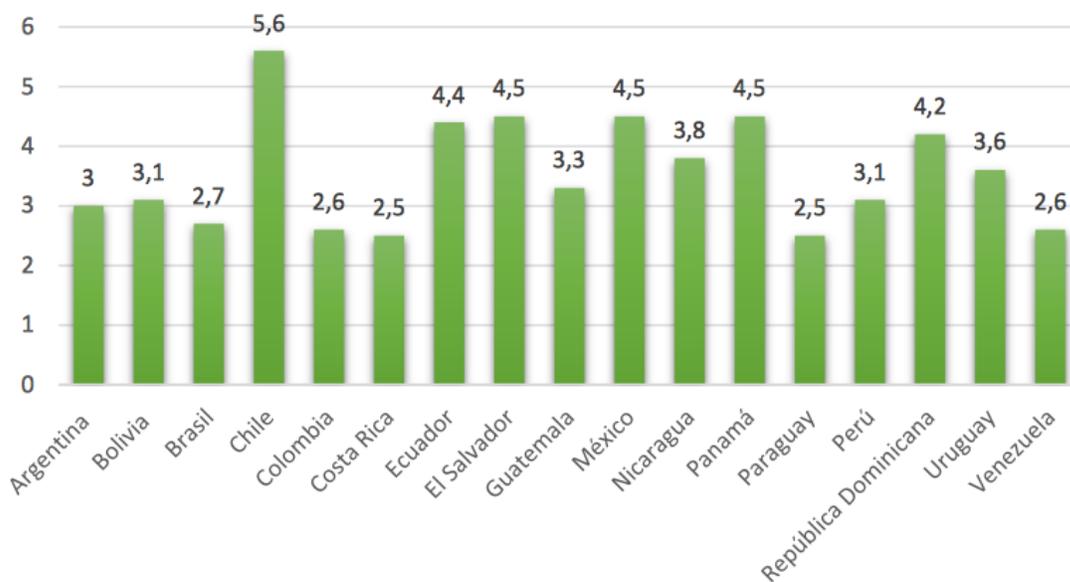
In the above graph the kilometers of roads are paved, in primary, secondary and tertiary in the Department of Antioquia sections are observed.

Clearly the country's road infrastructure and Antioquia's presents quality and quantity deficit, therefore little development has reached the region, that has not been thanks to the current road but to external factors that have led to this development.

The quality of infrastructure is no less important than the amount of paved kilometers. A well - paved road, built under the international framework and fourth - generation features, provide constant stability, confidence and security to the load as the conveyor guild; not to mention the savings achieved by reducing the costs of road maintenance, i.e. 4G highways also require constant maintenance but is run from the beginning applying the regulations, this will not require a lot of money in maintenance or future restructuring.

As expected, in the range of road quality, Colombia also cracked and therefore the department of Antioquia. On a scale from 0 to 6 where all the Latin American countries were evaluated; Colombia with Venezuela, Costa Rica and Paraguay, with he worst results . On the other hand, among the leading countries I with the Best Road Qualities with the first place Chile followed by Mexico, Panama and then El Salvador.

Graphic 5. Ranking Quality of Routes in Latin America



Source: (Duran, 2014)

Without any doubt, the poverty rate is directly linked to road development in the region. This development in addition to providing connectivity and agility is the engine that drives the department's economy. For this and for better economic position of the country and the department internationally, it is necessary to intervene the current network but also complement it with a modern, cutting-edge infrastructure that will help close the yawning gap existing between poverty and wealth.

3.3 Current costs of road transport in Antioquia

The scientific journal Engineering and Research said:

Considering an average load factor in tones per vehicle for each mode of transport and a factor equivalent vehicle, an indicator of internal cost for each of the transport modes recovered, and found the following: \$ 0.074 / ton / km mode of road transport. (Márquez Díaz, 2011).

While ground transportation costs worldwide are around about 0,075 dollars per tone-kilometer, i.e. 225 pesos ton-kilometer. In Colombia this cost is \$ 0.10 tone-kilometer, 300 pesos ton-kilometer which means an increase of 133% in domestic freight rates compared to domestic freight paid by other countries (see table 5).

For example mobilize a container from Medellin to the port of Santa Marta cost approximately 2 million 250 thousand pesos, equivalent to US \$ 750 (see table 5). Freight from Medellin to Barranquilla approaches one million 920 thousand pesos, USD 633 (see table 6). Cartagena Medellin freight easily can be about one million 815 thousand pesos, \$ 605 (see table 7) and freight Buenaventura Medellin is the most economical with an average of one million 540 thousand pesos, USD 513 (see table 8).

Table 5. Freight Medellín to Santa Marta, Container 20'

Resumen de Costos	
Costo total de movilizar la carga (1)	\$2,246,295.90
Costo total de los tiempos de espera, carga, descarga y consecución de carga (2)	\$0.00
Costo total del viaje (1+2+3)	\$2,246,295.90
Costo total de una hora adicional de espera, carga, descarga y consecución de carga.	\$16,951.93
Costo por tonelada.	\$249,588.43
Costo total tonelada por KM.	\$300.30
Costo total del viaje por KM.	\$2,702.70

Source: (Ministry of Transport, 2016)

Table 6. Freight Medellín to Barranquilla, Container 20'

Resumen de Costos	
Costo total de movilizar la carga (1)	\$1,917,564.54
Costo total de los tiempos de espera, carga, descarga y consecución de carga (2)	\$0.00
Costo total del viaje (1+2+3)	\$1,917,564.54
Costo total de una hora adicional de espera, carga, descarga y consecución de carga.	\$16,951.93
Costo por tonelada.	\$213,062.73
Costo total tonelada por KM.	\$316.82
Costo total del viaje por KM.	\$2,851.40

Source: (Ministry of Transport, 2016)

Table 7. Freight Medellín to Cartagena. Container 20'

Resumen de Costos	
Costo total de movilizar la carga (1)	\$1,814,238.72
Costo total de los tiempos de espera, carga, descarga y consecución de carga (2)	\$0.00
Costo total del viaje (1+2+3)	\$1,814,238.72
Costo total de una hora adicional de espera, carga, descarga y consecución de carga.	\$16,951.93
Costo por tonelada.	\$201,582.08
Costo total tonelada por KM.	\$321.00
Costo total del viaje por KM.	\$2,888.96

Source: (Ministry of Transport, 2016)

Table 8. Freight Medellín to Buenaventura, Container 20'

Resumen de Costos	
Costo total de movilizar la carga (1)	\$1,532,832.32
Costo total de los tiempos de espera, carga, descarga y consecución de carga (2)	\$0.00
Costo total del viaje (1+2+3)	\$1,532,832.32
Costo total de una hora adicional de espera, carga, descarga y consecución de carga.	\$16,951.93
Costo por tonelada.	\$170,314.70
Costo total tonelada por KM.	\$355.62
Costo total del viaje por KM.	\$3,200.60

Source: (Ministry of Transport, 2016)

The high prices reflected in the tables, shows how logistics costs – are disregarding production costs – a disadvantage for the producers in Antioquia when making a business . These costs certainly make this regional industry at low competitive compared to the global industry with more and better conditions that ensure their competitiveness, growth and success in business conducted.

Domestic freight costs are added international to the freight prices that end up worse. The disadvantage with some first world countries is so ridiculous, that in some cases such as the Euro Zone where the average international freight around USD 1,082 represents less than half of what it costs for international freight in Colombia Is USD 2,470. (seeTable 9).

Table 9. Average Cost for International Container Shipping

COUNTRY	2012	2013	2014
Euro Zone	\$ 1,080	\$ 1,070	\$ 1,082
U.S	\$ 1,315	\$ 1,276	\$ 1,289
Switzerland	\$ 1,440	\$ 1,440	\$ 1,440
Canada	\$ 1,660	\$ 1,680	\$ 1,680
Colombia	\$ 2,650	\$ 2,470	\$ 2,470

Source: (World Bank, 2015)

Once Again the country and the Antioquia region is at a disadvantage and at low competitiveness of the products, this makes the department loses the battle against high logistics costs of internal and external transport; despite being an industry that is known for its materials, designs and quality fails to overcome the disadvantages that the current logistics entails.

3.4 Reduction in freight times

The fourth generation Highways (4G), promise a reduction in travel time for the main cities of Colombia, especially for Medellin. These reductions include major routes for the department of Antioquia as is the route Medellin - Urabá (60%) and the least

significant but not least is given reduction in Medellin route - Cartagena (25%) (See table 2).

Reducing time in the department of Antioquia is analyzed based on the HDM4 simulation software - program used to analyze, plan, manage and evaluate investment decisions in international road plans.

A Five Axles truck starting from Medellin to different cities would have the following savings time:

Starting from Medellin, passing through Puerto Valdivia and finally arriving into Cartagena a route that normally takes 24 hours will be reduced to a distance of 18 hours this represents a 25% reduction in transport time (see Table 2).

Starting from Medellin to Cali with the current road has a course of 15 hours, after the project will be reduced to 8 hours of direct way, this would mean a reduction of 47% (see Table 2).

Starting from Medellin to the beginning of the Ruta del Sol has a course of 6 hours with the current highways, following the entry up 4G, this same route could be done in 4 hours, this means a reduction of 33% (see table 2).

One of the most significant reductions is the section of Medellin - Urabá which currently has as travel time of 10 hours after this mega project would have a travel time of 4 hours, this would mean a saving of 60% in the total time cargo transport.

Federico Restrepo Posada former manager of the Project Fourth generation (4G) confirmed through an interview in Blu Radio, the accuracy of this data and complemented it to the specifications saying that , these vehicles in a high load may travel at 80 km / h while currently the maximum speed for this type of vehicles is 40

km/h. "It is an issue of competitiveness, the simple fact of how long it takes a truck arriving to the ports". (Restrepo, Interview bluradio, 2013)

The benefit from these reductions of time not only will be for the Industries and freight. A private vehicle that travels from Medellin to Chigorodó in approximately 7 hours depending on weather and road conditions. It is estimated that after finishing the works, it will take it 2 hours to 3 hours to complete this journey. This could be perhaps the most important of the reductions in transit time.

Considering the Urabá region is completing building two ports, one small in Turbo, and one for large ships in Necoclí that would allow the department of Antioquia have autonomy and direct management of imports and exports in the region and will independent its international trade processes. That today have to be made through the coastal cities such as Barranquilla or Santa Marta.

According to the President of the Republic, Juan Manuel Santos Calderon and Vice President Germán Vargas Lleras in the event held by the University of Antioquia and the Pontificia Bolivariana called "Analysis of social and economic implications of the Highway of Prosperity in the Department of Antioquia "Event which was supported by the Government disclosed that:

"Highways of Prosperity, not only improve connectivity and competitiveness of the department, but also generate employment, integration, reduced logistics costs , " said Vargas Lleras to note that one of the results of the analysis, presented by the government in the event headlined by President Santos, shows that 52% of the Antioquia will receive a positive impact on the Highways of Prosperity "

Costs and high transport time are somehow an obstacle to trade, making it more difficult to obtain benefits on an international treaty or convention conducted by the nation.

A country with a low costs on land transport can develop in a way a comparative advantage in the production of their goods compared to those countries where the high cost of transport directly affects their competitiveness externally.

What is the impact of transport time in international trade?

According to the report on world trade in 2012:

"The time required to transfer a product space is a further obstacle to trade. Using the standard gravity equation of trade (including GDP, distance, common language and contiguity), supplemented with a variable timing shipping between ports, it estimates that an increase on the transport time decreases the volume of trade in about a quarter or a third party. "(World Road Association, 2010)

This statement makes it clear that an economy with a long period of time on the shipment of goods has a negative and significant direct impact on the international trade.

3.5 Reduction of transportation cost in Antioquia

As already mentioned before, the costs of both internal and external freight have a direct impact on the final value of the good produced by a region or country, as well as the provision of services demanded by the market. This is perhaps one of the topics that most affects the competitiveness of a region and to secure the greatest comparative advantage with other countries.

Based on current rates obtained from the Ministry of transportation. Calculations were made to determine the variations that could suffer the costs of transporting.

The most significant reductions are the routes to Santa Marta and Cartagena in which could reach up to reduce 700.000 thousand pesos per round Trip.

Table 10. Approximate Reduction Freight

ROUTE	KM TRAVEL	ACTUAL	REDUCTION	FREIGHT
		FREIGHT	OF TRAVEL	FUTURE
		CONTAINER		CONTAINER
		20 foot		20 foot
MDE - Santa Marta	840	\$ 2,246,295	33%	\$ 1,505,018
MDE - Barranquilla	749	\$ 1,917,564	33%	\$ 1,284,768
MDE - Cartagena	632	\$ 1,814,238	25%	\$ 1,360,679
MDE - B / ventura	498	\$ 1,532,832	47%	\$ 812,401

Source: Own construction based on (Ministry of Transport, 2016)

Future costs to transport a 20 - foot container from Medellin to the most important ports in the country are subject to equally reduce the travel time. These could consider a range of variation, however, it was decided to do this exercise to show that as well as reduce time, this project equally can reduce the cost of land transport from Medellin to the ports. These reductions also in favor to help reducing wear of machines and lowering fuel consumption per round.

These very significant reductions in all cases directly affect the final value of the trading Process.

In the production process this should take off different types of expenses and costs on the rates or variable that every organization must assume, but which are considered when setting the selling price of any product ready for marketing. This process occurs with all the independent assets.in its marketing process that carries out nationally or internationally costs.

If marketing is in an international level, when setting the final selling price of a good all the expenses need to be included, also the logistics costs of internal transport and international transport.

This problem of logistics costs adds to the majority of raw materials for imported products, expensive production costs at this point still high, compared with other countries that have achieved a synergy between mass production and use the of technology help them reduce the final costs of the product.

Since Antioquia has not combine technology and economies of scale in order to become more internationally competitive, this is something that need to start immediately if the goal is reducing logistics and transportation costs is necessary to build a new network of highways and the intervention of the current network that will impact significantly on reducing transport times, helping lower costs of final sales, currently this reductions have not been achieved through production processes.

3.6 Why build highways of Prosperity?

SWOT matrix

In this structure the SWOT matrix, it shows the different weaknesses, opportunities, strengths and threats that could face the Highways of Prosperity in its development in the department of Antioquia:

Weaknesses

Usually determinates the financial budget that is needed to reach the complete the full implementation of the works.

Complete the schedules activities proposed at the beginning of the project

Third parties that end up delaying the work.

Opportunities

Great potential for industrial development and competitiveness of the department industry.

Reduction on the logistics costs for transporting cargo from the department of Antioquia to ports.

Reduction in transport time between Medellin and the various ports.

Develop and promote tourism in the region.

Strengthen and improve conditions for current and upcoming trade agreements.

Strengths

The new network of the road infrastructure is specially designed and intended to facilitate the exits from Medellin to different ports of the country.

Increase route options for tourism.

Excellent communication and access roads between primary, secondary and tertiary regions of Antioquia.

Highways of Prosperity creates opportunities for the most isolated and least favored regions of the department.

It will improve mobility, reducing mobilization time and reducing fuel consumption.

Threats

Some of the major obstacles to the completion of the works may be the topography of the region, financial costs, climate changes, and armed conflict.

There is much uncertainty among businesses and citizens in relation to the capacity of the state on handling the budget and overcoming obstacles.

Delays in the management of permits, licenses and awards.

Delays or difficulties in buying some properties that may be in the middle of some of the new tracks.

As shown in the SWOT matrix described above, There are more strengths and opportunities that can be obtained from the project implementation for the department of Antioquia and in general for the whole nation. The weaknesses and threats cant be ignore, those can be mitigated with good strategic planning that allows turning those failures into positive variables that play in favor of the project.

Strategic distribution of resources for research, science and technology and the implementation of this mega Highways of Prosperity project was positively reflected in the region of Antioquia Economically and logistically.

Antioquia is the department that will benefit the most for the entry into operation of the mega work, because of the 8 sections or stages that make up the project in May and have a epicenter location in the department.

According to Luis Fernando Andrade president of the National Infrastructure Agency ANI:

The 5 stages intercommunicate with other road projects are:

Approach in the Colombian Central West with the Atlantic Coast through the road to Urabá is achieved.

The connection to the north of the country in dual carriageways connect production centers with the center of the Colombian and the port of Cartagena:

The development of the transverse axis connecting the south is completed, the departments of the coast with the center and the Colombian and Venezuela east Connection to the South of the country in dual carriageways bring the production centers in central Mexico with the port of Buenaventura.

The Western Trunk Line has continuity in the process of competitiveness from the department of Cauca to Caucasia.

Connectivity and continuity of routes of national competitiveness is achieved: road Malla del Valle del Cauca, Autopistas del Café, Transversal de las Americas, Ruta del Sol (Andrade, 2013).

The production processes of the Antioquia industry, is often increasing costs for the expensive product process, and is reflected at the end, on the final consumer directly affecting the competitiveness of the department. These conditions makes necessary to start as soon as possible the restructuring of the entire road infrastructure and implement the new concessions that will reduce logistics costs improve the exchange of goods produced which will directly influence the economic development of the region.

4. Evaluating Facts

During the development of this work, it was confirmed that there are many gaps and needs for the roads of Colombia. Logistically Colombia is one of the countries with the worst road infrastructure in Latin America, more specifically in the department of Antioquia.

These logistics and transport failures directly affect the international trade, especially the entry and exit of goods and tourists on land ports, especially the majority of production facilities are located in the center of the country.

Currently the travel times between the department of Antioquia and the different ports have a high cost and a long travel time, this means low competitiveness of Antioquia products in the international market.

Bad weather, landslides, the topography, the low speed of trucks traveling on roads today are additional factors that influence the effectiveness of cargo transportation for export and import to and from the Antioquia department.

It also reaffirmed that the development of the different municipalities is linked mainly to the state of roads and access roads within the major challenges of the department of Antioquia is the road infrastructure that connects the sea.

All this causes the current logistical problems, especially the high cost of domestic freight, being more costly to take a container from Medellin to Cartagena than to Shanghai to Cartagena.

Highways of prosperity or highways G4 are seen as a way to help reduce the high costs on transit time of goods from the department of Antioquia to ports, also it focuses on improving the conditions of the current road network and generate routes alternatives, turning logistics and transport processes in Colombia and Antioquia department more efficient. For this reason objectives that allow determine the impact of highways 4Generation the Antioquia economy and foreign trade sector.

This research was supported by relevant information to the topic, analyzing transit times and costs versus current times and project costs after the construction is completed. It was based on information from specialists in logistics and economic issues, research papers and articles in scientific journals.

5. Conclusions and recommendations

5.1 conclusions

After conducting the research analysis to carry out this work can be concluded that the network of road infrastructure of a country can largely determine the economic development of nations and their industrial regions.

Without proper road development is impossible for Antioquia and Colombia in general, with its production developed into the territory, the department even the Nation can be internationally competitive.

The road development in Antioquia department hasn't been appropriate or sufficient for the goal proposed on the industry over the past 50 years, much less commercial challenges to be faced in the near future.

Internal freight in Colombia and especially in Antioquia can become so high that sometimes may even exceed the costs of an international freight.

Highways of Prosperity is targeted to provide relief time for the challenges facing the department in the future in the short term but should create a synergy between road development and economic development of Antioquia to boost the growth and equitably.

The reduction in transport times directly influence the low freight rates from Medellin to ports, it is as relevant and important to improve the competitiveness of the region without any doubt.

5.2 Recommendations

Some of the factors to improve in the competitiveness of the region can be: working days of activity on the primary customs zones.

A year has 365 days in Colombia of those year, only 305 are working days.

Usually in the world, a trucks travel 14,500 kilometers per month in Colombia can only travel about 7,500 kilometers per month.

Road restrictions on the operation return and other programs stimulated by the government for the cargo trucks and passengers also affect transport times, one strategy is redesign these strategies to mitigate its negative effect on freight without demerit the importance of these activities to control the roads.

In contrast to other ports in the world in Colombia the ports only work 16 hours from Monday to Saturday, the same applies to storage tanks where it only works Monday to Friday 10 hours a day. These restrictions also adversely affect the competitiveness and economic development of the Antioquia region and the country in general.

Maintain constant innovation and development roads to keep the region at the Front with major countries and encourage the competitiveness of goods produced in Antioquia to achieve the expected economic growth.

Antioquia needs to develop ports that provide independence and autonomy in the processes of import and export department.

Combine the development of road infrastructure with mass production processes operation; this with technology to help further reduce production costs and improve the competitiveness of the department of Antioquia.

6. References

National Infrastructure Agency ANI. (13 March 2015) *tear off the highway to the Magdalena River project 2*. Retrieved on March 25, 2016, National Infrastructure Agency ANI: www.ani.gov.co.

National Infrastructure Agency ANI. (February 20, 2015). *Let us be clear of 4G* Retrieved on March 5, 2016, Slide Share: http://es.slideshare.net/ANI_Colombia/hablemos-claro-de-las-4g-34458039.

Aguirre, R. (11 November 2014) *In November 2015 tear Pacific 3*. Retrieved March 16, 2016, La Patria: <http://www.lapatria.com/economia/en-noviembre-del-2015-arrancaria-Pacific-iii-146301>.

Andrade, LF (31 January 2013). *Fourth generation of highway concessions in Colombia* Retrieved on March 5, 2016, National Infrastructure Agency ANI: http://www.ani.gov.co/sites/default/files/cuarta_generacion_de_concesiones_luis_fernando_andrade_moreno.pdf.

Arias, M. (January 27, 2016) *North Connection starts in February*. Retrieved on March 25, 2016, El Colombiano: <http://www.elcolombiano.com/antioquia/conexion-norte-inicia-en-AI3497534> February.

Atehortúa, FA (April 10, 2016). Chemical engineer. Historian. Master in environment and development. Training and research coordinator and Knowledge Management SAS (Organizational Consulting). Professor of the School of International Studies ESUMER. (EA Delgado, Interviewer).

World Bank. (20 February 2015). *World Development Indicators*. Retrieved on April 17, 2016, of <http://datos.bancomundial.org/indicador/IC.IMP.COST.CD>.

Bank of the Republic of Colombia. . (June 7, 2015) . *Economic development and work organization* Retrieved on March 10, 2016, Cultural Banrep.

Chamber of Commerce of Medellin. (2012). *Economics of Antioquia gained ground in 2011 and 2012. Total Challenges for Medellin.*

Chamber of Commerce of Medellin. . (September 2, 2014) .*Autopistas a challenge for prosperity* Retrieved on March 20, 2016, Medellin Camera: <http://www.camaramedellin.com.co/site/Noticias/Autopistas-para-la-prosperidad-a-desafio.aspx>

Chamber of Commerce of Medellin. . (October 10, 2015) . *Infrastructure Group Competitiveness* Retrieved on March 24, 2016, Medellin Camera: <http://www.camaramedellin.com.co/site/Noticias/Grupo-Infraestructura-para-la-competitividad.aspx>

Concession La Pintada. . (12 May 2014) *concession highways Pacific 2. Project* Retrieved on March 15, 2016, Concession La Pintada: <http://concesionlapintada.com/el-proyecto/>

Duran, E. (1 August 2014) . *Quality of Infrastructure and Poverty in Latin America* Retrieved on April 15, 2016, University of Chile: <http://repositorio.uahurtado.cl/bitstream/handle/11242/6630/I-306.pdf?sequence=1>

Fajardo, L. (June 10, 2015) . *The countries with the best and worst roads in A. America* Retrieved March 25, 2016, BBC World: http://www.bbc.com/mundo/news/2015/06/150609_economia_mejores_peores_carreteras_if

Fedesarrollo. . (25 May 2012) . *Economic Development of the region* Retrieved on March 5, 2016, Fedesarrollo: <http://www.fedesarrollo.org.co>

Gonzalez, AM (21 September 2012). *Road Infrastructure in Colombia, an economic analysis as a contribution to the development of the regions.* Retrieved on March 30, 2016, La Salle University: <http://repository.lasalle.edu.co/bitstream/handle/10185/12066/T10.06%20G589in.pdf?sequence=1>

Huici, R. (January 17, 2012) . *Avenues for integration and equity Program* Retrieved March 25, 2016, Inter - American Development Bank: <http://idbdocs.iadb.org/wsdocs/getdocument.aspx?docnum=860990>

Mario, GC (15 February 2015) . *North Connection fourth project that starts motorways* Retrieved March 5, 2016, El Colombiano: <http://www.elcolombiano.com/antioquia/conexion-norte-cuarto-proyecto-que-se-inicia-de-las-autopistas-1-YB1223177>

Marquez, LG (04, 2011). Estimating marginal external costs of modes of road, river and rail transport in Colombia. *Research Engineering* 7.

Market, DA (23 December 2015) *Antioquia economic growth had slowed*. Retrieved on March 18, 2016, El Tiempo: <http://www.eltiempo.com/colombia/medellin/crecimiento-economico-en-antioquia-ha-sido-desacelerado/16464831>

Ministry of Transport.. (April 17, 2016) . *Freight Calculator* Retrieved on April 17, 2016, Ministry of Transport: https://www.mintransporte.gov.co/Publicaciones/en_linea/sistema_de_informacion_de_costs_eficientes_para_el_transporte_automotor_de_carga_sice-tac

Pardo, C. (23 November 2012) *Low quality of infrastructure affects competitiveness*. Retrieved on March 25, 2016, Portfolio: <http://www.portafolio.co/economia/finanzas/baja-calidad-infraestructura-competitiveness-109626> It affects-

Restrepo, F. (9 April 2013) *Opening highways prequalification project for prosperity*. Retrieved on March 26, 2016, Medellin Chamber: http://www.camamedellin.com.co/site/Portals/0/Documentos/2013/APP-Presentacion_Proyecto-Federico_Restrepo.pdf

Restrepo, F. (14 July 2013) . *Interview bluradio* Retrieved on April 5, 2016, of bluradio: <http://www.bluradio.com>

Week. (September 12, 2015) . *Antioquia is connected with prosperity* Retrieved on March 28, 2016, Week: <http://www.semana.com/economia/articulo/las-autopistas-de-la-prosperidad/442185-3>

Valencia, V. (May 23, 2014) . *A road infrastructure for the long term* Retrieved on March 25, 2016, University of Antioquia: <http://sikuani.udea.edu.co/webmaster/elecciones2014/especial/InfraVial/Infraestructura.htm>

Valencia, JC (June 3, 2014) *ANI adjudge Pacific Highway 1 Prosperity*. Retrieved on March 10, 2016, La Patria: <http://www.lapatria.com/economia/ani-adjudico-pacifico-1-de-highways-for-prosperity-90011>

World Road Association. . (February 25, 2010) . *HDM-4 Software* Retrieved on April 16, 2016, to exchange knowledge and techniques on roads and road transportation: <http://www.piarc.org/es/Base-Conocimiento/gestion-of-heritage-road/HDM-4-Software/>

Zamora, N. (10 of 2012) . *Diagnosis of the current road infrastructure in Colombia* Retrieved on April 5, 2016, University EAN: <http://repository.ean.edu.co/bitstream/handle/10882/3405/ZamoraNelida2012.pdf?sequence=5&isAllowed=y>

7.Attachment

This is an Interview with Atehortúa Hurtado, Federico Alonso. Chemical engineer. Historian. Master in environment and development. Training and research coordinator and Knowledge Management SAS (Organizational Consulting). Professor of the School of International Studies ESUMER.

1. What condition is considered to road infrastructure in the department of Antioquia and Colombia in general?

In both cases there is an obvious historical delay. Colombia's road infrastructure was not built to interconnect these regions and the world, but with a provincial vision of regional elites themselves could connect with the outside. The result is an off road infrastructure, very poor technical quality and specifications with a very limited capacity. Now they are making significant efforts to recover this gaps, for example the Medellin-Bolombolo dual carriageway and road connection Urabá, but still a long way to go to make the leap is needed in infrastructure.

2. What opinion do you have about the macro project that is being developed known as Autopistas de la Prosperidad?

Excellent, but Late no doubt, but is a response to a structural need to connect Antioquia with the main ports of the country and the capital, through roads with better techniques and greater capacity specifications.

3. Do you think this project is really going to favor the regions involved? What are the positive and negative aspects?

The most positive aspect is the ability to move cargo and passengers faster and more economically, to and from Antioquia. On the negative side could mention the environmental impact of these major engineering works, which has already led to conflicts with communities in other parts of the country as Santanderes, but expect a responsible social and environmental management by the builders, this can be mitigate and manage.

4. What do you think, would be the greatest economic and social impacts of the construction of these highways for Antioqueño market?

Will potentially increase the trade to and from Antioquia, facilitating job creation and expanding the export dynamics of the region.

5. Do you think that investment in this project will give the expected results Short and Long Term?

Yes, providing that adequate control of public resources and the investment to prevent any delays and corruption or conflicts between the current departmental administration of Antioquia and the former governor.

6. From your point of view, who will benefit most, Colombian exporters and international companies that want to bring their product to the local market?

Both of them. Finally it can serve both to export and to import. Trade flows in one or other direction does not depend on the infrastructure but trade agreements. But in the current conditions of devaluation of the Colombian peso, could benefit more our exporters.

7. Do you think the government can meet the deadline for the construction or n the Motorways of prosperity, scheduled to be completed in 2020?

It is difficult to predict, because it depends only on the government but other factors (public policy, climate, inflow of foreign capital). The current situation of falling foreign investment in Colombia seems to point that will be financing difficulties. On the other hand, there are unfortunate bad practices of some Colombian builders not anticipate risks before the contract, which causes problems they may encounter in their development.

8. What do you consider Is the main pillars for economic development of a region?

Safety, quality education, research in science, technology and innovation, physical infrastructure and institutional structure.

9. Do you think the department is on a Good track?

Antioquia has been making a major effort in the areas of quality education, research, science, technology and innovation. The 4G infrastructures and the construction of Puerto de Urabá will enforce further development of the region. Also the peace agreements with the FARC could help certain areas historically affected by the guerrilla presence energize. However is the great threat of the presence of the neo-

paramilitary (misnamed "criminal gangs") groups are taking large areas of the Department.

10. What about the country, what do you think will be the impact?

Riding on the oil boom of 2005-2015, the Colombian state had some significant progress in reducing poverty and improving road infrastructure. But now that the boom is over (at current oil prices), these gains are at risk if the price does not raise a new institutional and tax structure that allows, sustainable over time. On the other hand, there remain profound difficulties in other subjects such as health. Also is the great threat of the presence of the neo-paramilitaries (so-called "criminal gangs") groups are taking large areas of the country.

11. Do you think the relationship at the time of transport the solution to improve the country's competitiveness?

It helps improve, but does not solve all problems. Strengthening of industrial capacity, facilitation of procedures before the State, the training of competent human talent, are other factors that must be addressed if we want to be more competitive.

Interview with Velez, Inés Alicia. Teacher logistics of the International Physical Distribution, University Foundation ESUMER

1. How do you think is the department of Antioquia in logistics? And the country in general?

Colombia has considerable delay in logistics, performance indicators is showing weakness in infrastructure; multiplicity of procedures for impo and expo; long transit times; high costs due to the inefficiency of resources.

2. What do you think about the Project that persuit Prosperity ?

A great project that will allow Antioquia progress in improving competitiveness.

3. Do you think that Colombia and especially the department of Antioquia really need the implementation of this project?

For sure...these investments should have been done in Colombia many years ago...

4. Logistically what do you think will be the positive impact for the department of Antioquia building this mega work?

Benefits shall surely be time reduction that should be reflected in better transportation costs, therefore in improving competitiveness. Another aspect is safety improvement, with better specifications for the presence of road accidents is reduced.

5. Logistically what do you think will be the negative impact Antioquia department building this mega work?

As long as the project has resources to implement and be completed with all environmental aspects, I do not see why there would be any negative impacts.

6. What is the importance of transit times for the competitiveness of an economy, such as the department of Antioquia?

It is not the same as a cargo arrives in port in less than a day that if it Does in several days. These delays affect the costs and timing on the international markets.

7. What is the impact of reducing transportation times, on the international trade?

It is one of the most important variables, because from the point of view of prices, these are regulated by supply and demand, the real difference in competitiveness will be given by aspects of service, such as transit times, response to complaints, traceability, customer services.

8. is time reduction a significant fact? In some cases can be up to 40% and 60% of total travel time?

If the roads are built for the specifications designed such as (bridges, viaducts, dual carriageways) is obvious that reducing the time is a positive Fact, the problem would be to change the specifications of the Roads.

9. How can such reductions on time, can influence the cost of domestic freight?

Unless transit time decreases, all costs: fuel, maintenance, insurance, wear. etc, should be reflected in the freight.

10. Do you think that these reductions will boost the competitiveness of the department and the country in general?

It is an element. Businesses should work in other ways, for example in products (innovation) with guidance and support of the state.

11. What other measures or alternatives should be implemented to improve logistics in freight transport to be more competitive internationally?

There should be a detailed custom processes, more agility, investment and support on the research. There should be State entities involved in the process, to be facilitators and not Uncooperative processes.

12. Do you think that this mega project will improve the economy of the Department of Antioquia ?

Naturally. A more competitive infrastructure means, more sales. A higher sales more production. A higher production more employment and income generation for all.