Application of the analytic network process (ANP)to select new foreign markets to export software services: study of colombian firms

Aplicación del proceso analítico de red (ANP) para seleccionar nuevos mercados extranjeros para exportar servicios de software: Estudio de firmas colombianos

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ABSTRACT

The selection of export markets is a complex and important decision for small and medium enterprises (SMEs) of developing countries interested in exporting for the first time. Given this issue, SMEs enroll export programs to receive consultancy for their internationalization process. One of this export programs is directed by the Colombian trade bureau, a Trade Promotion Organization (TPO). This TPO developed a market selection model that lacks a process to validate the weights selected. Therefore, the results of the TPO model are deficient in generating enough confidence to motivate the company owner to export. On the other hand, we identified that some of the criteria used in the TPO model were related to each other, but this model assumes criteria as independent. Due to the fact that the selection of export markets is a multi-criteria decision that involves feedback, we proposed an ANP model for the selection of countries to export software services for Colombian SMEs. Upon comparing the market selection model of the TPO with the ANP model, we identified that the results of both models are similar in the ranking of the countries. However, we concluded that the proposed model is better because it has a structured methodology to assign weights that allows evaluation of the consistency of the weights allocated to the selected criteria. Besides, we also preferred it because allows analyzing sensitivity to changes in the priority weights. The categories of variables that we used in both models are: market, economy and logistics, among other.

Key words: Analytic Network Process, Software Services, International Commerce, Selection of Markets

RESUMEN

La selección de los mercados de exportación es una decisión compleja e importante para las pequeñas y medianas empresas (PYME) en el desarrollo para los países interesados en exportar por primera vez. Por ello, la importancia de los programas de exportación de consultoría para su proceso de internacionalización. Los programas están dirigidos por la oficina de comercio de Colombia, y por Promoción del Comercio Organización. Este OPC ha desarrollado un modelo de selección de mercado pero carece de un proceso para validar los pesos seleccionados y los resultados del modelo OPC son deficientes en la generación de confianza suficiente como para motivar al propietario de la empresa para exportar. Por otra parte, solo algunos de los criterios utilizados en el modelo OPC se relacionan entre sí, ya que la mayoría asume este modelo criterios independientes. La selección de los mercados de exportación es una decisión multicriterio y se ha propuesto un modelo de la ANP para la selección de países para exportar servicios de software para las PYME colombiana. Al comparar el modelo de selección de mercado de las OPC con el modelo de la ANP, se identificó que los resultados de ambos modelos son similares en el ranking de los países. El modelo propuesto es mejor porque tiene una metodología estructurada de asignación de pesos, que permite la evaluación de la consistencia de los miemos con asignación a los criterios seleccionados, son ponderados los cambios como la sensibilidad prioritaria.

Palabras clave: Red Analítica de Procesos, Servicios de Software, Comercio Internacional, Selección de los mercados

1. Introduction

In this research we developed a model for the selection of countries to export using the ANP. Actually, a model developed by a TPO, directed by the Colombian trade bureau, is used to rank countries to export for SMEs. But this model lacks a process to validate the weights assigned to the criteria and the alternatives. Therefore, the results of the TPO model are deficient in generating enough confidence to motivate the company owner to export. Besides, we identified that the market selection criteria used in the TPO model where related to each other. Thus, we proposed an ANP model for the selection of countries to export, which is a multi-criteria decision model that allows checking the consistency of the weights assigned to the criteria and the alternatives and, also, allows taking into account the feedback relations among criteria.

We decided to develop a ANP model for only one economic sector due to the fact that in previews investigations was identified that the criteria selected to make part of the model and its feedback relations depend on the sector analyzed (Lesmes, 2008). We focused in the software services sector because the TPO developed a special program to help SMEs of that sector to export, which facilitated the contact with the companies and, thus, the data gathering. We selected ten companies that make part of that program and we applied the ANP model and the TPO model for each of those companies, then, the results obtained with both models were compared.

This investigation was guided by a panel of experts in foreign trade, and by other sources, as publications and the internet. The publications and the panel of experts helped to define the actors, criteria and the relations of influence among criteria. We rely mainly on two books to define the criteria, *Competitividad de la empresa exportadora española* (Alonso & Donoso, 1994) and *Pymes: gestión para la competitividad*, overall on chapter 4 of the last book named *Inteligencia de mercados para la gestión internacional de la pyme* (Ferro & al., 2004). The sources that we used in the internet to find studies and statistical data related to the market conditions of different countries were Proexport (www.proexport.com.co), ICEX (www.icex.es) and Prochile (www.prochile.cl); those institutions are TPOs from Colombia, Spain and Chile, respectively.

This paper is organized as follows: in Section 2, we describe the market selection theory. Then, we present the research theory and methodology, in section 3. In section 4, we show the TPO model and the ANP model proposed for ranking the countries. In section 5, we compare the results obtained with the TPO model and the ANP model. Finally, in section 6, we describe the conclusions and recommendations of the investigation.

2. Foreign market selection theory

A TPO directed by the Colombian trade bureau developed a special program to help SMEs to export. The program consists of seven stages, as shown in Figure 1. In the first stage the SMEs are motivated to export. In the second stage, a review of all the requirements that the company must meet to export is made. The third stage consists in the selection of export markets. Afterwards, the export strategy is designed. In the fifth stage, the company should export. In the sixth, the company owner must be prepared to make a business trip. Finally, an assessment of the export process is made (Proexport, 2006).

In this research we only focused in the third stage, the selection of exports markets, in this stage a previews research of the possible countries where the company should export is made. Afterwards some selection criteria are used to reduce the markets of interest until the companies end up with five countries. To make a raking of those countries the TPO developed a market selection matrix, which is described in Sections 3 and 6 of this paper.

3. Research theory and methodology

In this section we make a general description of the TPO market selection matrix and we make an ANP theory overview, then, we describe the methodology that we are going to follow for the development of this paper.

3.1. TPO market selection matrix

The matrix shown in Figure 2 was designed by a TPO named Proexport, which is an organization in charge of promoting exports, international tourism and foreign investment in Colombia. The market selection matrix makes part of the third stage of the TPO export program. As said earlier, this matrix is only used until the markets of interest are reduced to maximum five countries. The matrix manages information about different countries and different variables, which are used to evaluate the selection of a market. The current matrix allows determining the variables that the company owner and the consultant want to include.

The variables in the matrix depend on the product or the service that sells the company. The countries evaluated are selected previously by the company owner; those markets are the one that are going to be evaluated for exporting the service, in this case. The qualification is a grade that the company owner assigns to each country according to its performance with respect to the variable evaluated, this qualification hinges on the company owner criteria. The weights represent the relative importance of each variable. The weights assigned to each variable rely on the company owner and the consultant criteria. The final result per country arises from the summation of the multiplication between the weight of the variable and the correspondent value that takes the variable for the country. From those results the country ranking is obtained.

3.2. ANP theory overview

The Analytic Hierarchy Process (AHP) and its extension, the ANP, are tools used in multi-criteria decision analysis. The AHP

Figure 1. TPO export program

PROEXPORT COLOMBIA

Variable	Weights	Country 1	Qualification Country 1	Country 2	Qualification Country 2	Country 3	Qualification Country 3
Colombian Exports							
Colombian Exports Growth							
World Imports							
Duty							
Population							
GDP							
GDP Growth (%)							
GDP per Capita							
Devaluation							
Sovereign risk							
Logistic							
Potentiality							
Result							

Figure 2. TPO market selection matrix

consists of a goal, criteria and alternatives, which are arranged in a hierarchy structure where the lower level elements influence on higher level elements, as shown in Figure 3. Nevertheless, many decision problems cannot be structure in a Hierarchy because they involve besides the mentioned relations, dependences between the alternatives, dependences of the criteria that belong to a same level, or dependence of higher level elements on lower level elements (Saaty T. L., 2001, pp. 83-84, 180). This concern motivated Thomas Saaty to develop the ANP; which makes it possible for the problem to develop naturally because it doesn't impose a structure (Saaty T. L., 2001, p. 181), as shows Figure 3, a network can be extended in all directions.

In order to obtain the priorities to rank alternatives in a decision model the ANP uses pairwase comparisons. A pairwise comparison matrix is form when comparing a pair or more pair of elements with respect to a reference element, which remains unchangeable for all the comparisons. To make such comparison Thomas Saaty developed the scale show in Table 1, which allows measuring the strength of the judgments (Saaty T. L., 2008, p. 7).

Table 1. Saaty's Fundamental scale

Intensity of Importance	Definition
1	Equal importance
3	Moderate importance
5	Strong importance
7	Very strong importance
9	Extreme importance
2, 4, 6, 8	Intermediate values

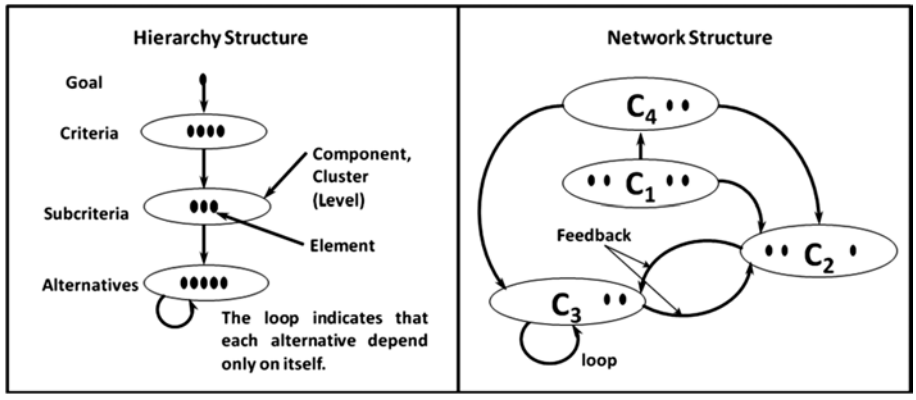

Figure 3. Hierarchical and network Structure

Fuente: Saaty (2005).

In order to validate the consistency of the judgments of the pairwise comparisons matrices the consistency ration (C.R.) of the matrices is calculated. According to Saaty (2001, p. 57) the consistency ratio should be less or equal to 0.1, 0.2 is the maximum value that can be tolerated. In order to calculate the consistency ratio of matrix A, for example, first it is necessary to determine the consistency index:

Consistency Index of Matrix (1)

Matrix theory states that a reciprocal matrix, as the case of the pairwise comparison matrix, is consistent when the maximum eigenvalue of the matrix is equal to the size of a square matrix n x n. In this sense the consistency index should approach zero. A pairwise comparison matrix is consistent if their judgments are ruled by the transitivity principal (Saaty T. L., 2005, pág. 51). Before calculating the C.R. is necessary to estimate the average random consistency index (R.I.), which is obtained from random reciprocal matrix using Saaty's fundamental scale. Assuming that a random matrix doesn't have to be necessarily consistent, it is expected that the R.I. should be greater than the C.I. (Saaty T. L., 2001, p. 57), and therefore the C.R. should be small. The C.R. of matrix A is defined as follows:

Consistency Ratio of Matrix (2)

From the pairwase comparison matrices is obtained an eigenvector of priorities. Those priorities allow comparing the relative importance of some elements respect to a criteria or element to which they were compared. When all the eigenvector of the decision model are calculated, this are used to conform the unweighted supermatrix. To construct this matrix suppose that there are N components. Also, suppose that the component h, denoted by C_h, h=1,..., N, has n_h elements, that are denoted by e_{h1}, e_{h2},..., e_{hnk} as shown in Figure 3 (Saaty T. L., 2005, pág. 51).

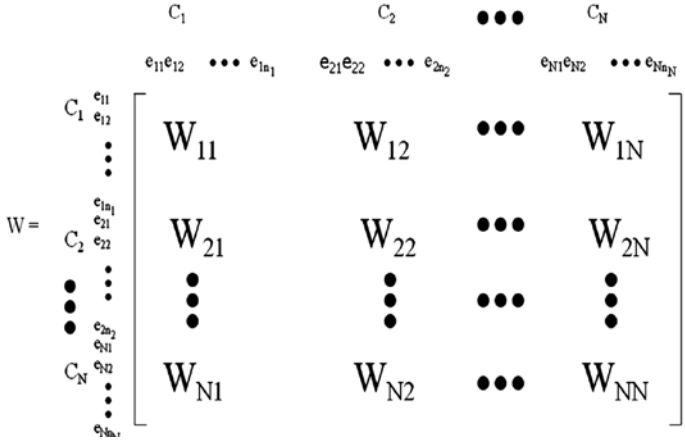

Figure 4. Supermatriz structure

In the supermatrix each of the eigenvector is assigned to the correspondent column. The elements in the superior row are the criteria used as reference for making the comparison, if there is no influence of the element of the left column with respect to the criteria in the superior row, the correspondent value in the supermatrix is cero. The next step according to Saaty methodology is to construct the weighted supermatrix using the component matrix to weight the supermatrix previously assembled. The calculation of the weighted supermatrix is necessary in order to make the matrix stochastic. This condition is necessary for obtaining the resulting limit supermatrix. This matrix is calculated elevating the weighted supermatrix to the nth power. This procedure allows capturing the transmission of influences from all the paths of the network that had been built. For example, to obtain indirect influences through a third element the weighted supermatrix must be power to the square (2001, págs. 94-97).

In the model proposed in this paper we used one additional aspects of the ANP that make part of complex decisions, the merits, as

shown in Figure 5. The merits are the benefits, opportunities, costs and risks of a decision. Each of the merits has its own decision network, it is important to notice that not all of the merits have to be present in a decision model, as in the case of this decision problem. When doing pairwise comparison of the criteria under the risks and costs merits it is always necessary to ask what is the most expensive or risky criteria, because the costs and risks are subtracted in the formula for calculating the priorities of the alternatives (Saaty T. L., 2001, págs. 93-94). There are several formulas for calculating the synthesis of results using the software Super Decisions, as for example the additive probabilistic formula:

$$bB_i + oO_i - c(1-C_i) - r(1 - R_i) \quad i = 1, \ldots, n. \; [i: = alternativas] \quad (3)$$

The formulas allow obtaining the ranking of alternatives in this multi-criteria decision tool. The software Super Decision offers the possibility of making sensitivity analysis to observe how the ranking of alternatives behaves when making small changes in priorities, as for example, changes in the priority of the merits of the decision. It is important to notice that the sensitivity analysis in the software works for all formulas except for the multiplicative formula because that formula does not consider changes in the priorities of the merits.

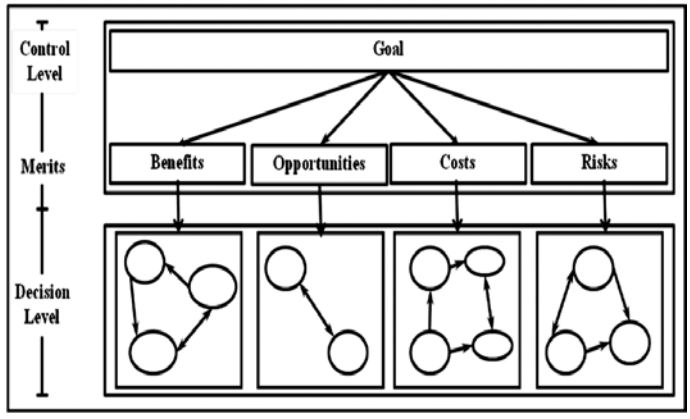

Figure 5. Structure of the ANP model proposed

4. Research methodology

The methodology that we developed for this research is structured in the steps shown in Figure 6:

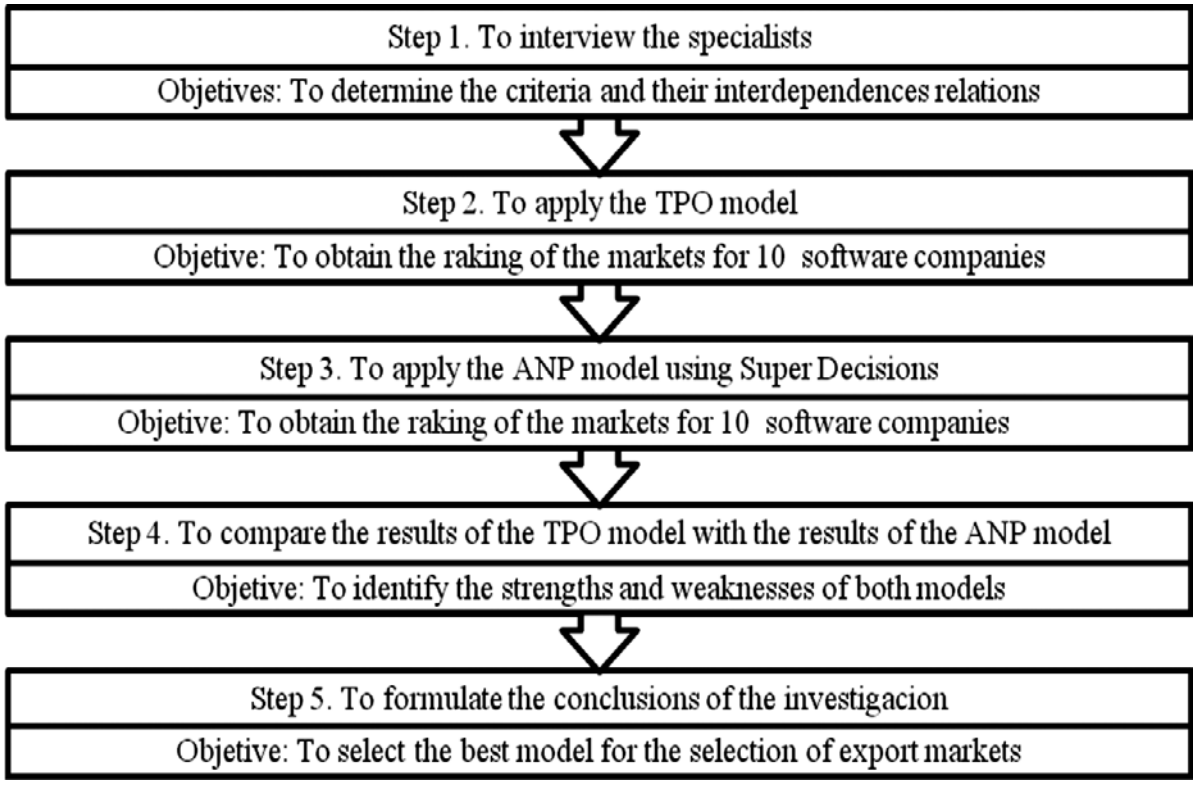

Figure 6. Research methodology

Fuente: Saat (2001) Methodology.

5. Definition of the criteria

In order to determine the decision criteria that should be in this study we used as a reference a model that implements ANP to support SMEs producers of goods in their internationalization process (Lesmes, 2008). From this model, we selected the components and criteria that apply to the software services sector, and then we added other components and criteria that we considered discriminating for the selection of export markets for the Colombian software industry.

Table 2 shows each one of the criteria select to evaluate the countries or the alternatives to export and explain their relevance for the market selection model. The criteria were classified in seventh components by their homogeneous characteristics. The criteria mentioned next are defined because they require a detailed explanation in order to be understood. Country risk, measures the economic risk of investing in a nation. Uses a measure scale fixed by prestigious international risk qualifiers. Exports from Colombia, represents the size, in dollars, of the software services exports from Colombia to the countries being evaluated for the last three years. Main suppliers, groups the countries that exports software services to the market being evaluated and the size of the imports in dollars or a percentage of the total software services imports for each country. Trade agreements, describes the trade agreements that Colombia has with each of the countries evaluated. Taxes describe the taxes policy in the country evaluated and Intellectual property describes the intellectual property laws that protect the software services sector in the market. Target population, counts the number of companies that are potential buyers of software services in the country evaluated. Public price represents the price of the software to the public in the country evaluated and Pirate price represents the price of pirate software in the country evaluated. Main competitors, describes the main competitors within the country evaluated, the description should include the number and size of the main competitors. To measure the size of the competitors, for example, it is an option to use their profits of the last years as measure rule, if possible. Exploratory exports, indicates if the company exported to the country evaluated and if it represents an opportunity to make further exports. Due to the fact that the companies are not yet regular exports we call these criterion exploratory exports. Quality certificates, checks if the company has the quality certificates necessaries to export to the market evaluated and whether the quality certificates make the company competitive in that market. To check if the quality certificates make the company competitive, compare them with the quality certificates of the main competitors in the country evaluated.

6. Application of the models

The companies involved in this study are SMEs that belong to the software services sector in the Colombian market. Most of the companies have never export and if they did, the percentage of the exports, as part of the sales, is small. Following next we are going to present the applications of the ANP model and the TPO model for the companies involved in the study. The names of the countries are not mentioned because of confidentially agreements.

6.1. International markets selection matrix

To apply the TPO model first is necessary to assign weights to the components and its criteria. To assign the weights we organized a meeting with experts in foreign trade, in the meeting the group deliberated about the weights they had to assign to each component and its criteria and when they reached an agreement they allocated the weights shown in Table 4. The same weights were assigned to the components and its criteria in each of the 10 matrix models. Usually the weights assignation is done differently; each company owner guided by a consultant assign their own weights to the components and its criteria, but we wanted to make results comparable, so we assigned the same weights.

The countries evaluated were selected in previous studies that the TPO did for the software services companies registered in their program. Those countries are Costa Rica, Ecuador, Argentina, Chile, USA, Venezuela, Peru, Guatemala, Brazil and Mexico. Table 3 shows a part of the market selection matrix for one of the companies. In the matrix we registered the information for one of the countries selected by the company. We do not show all the potential markets selected by the company, so the matrix fits on the page. After completing the information for each country in the international markets selection matrix, the next step is to grade the criteria. The grades that can be awarded are five, three or one, with five being the highest rating. Each owner or owners of the company grade the performance of each country with respect to the criterion, with the help of a consultant, who advices the company. Later the weights of each of the criteria is multiplied by its respective grade, the results of the criteria that belong to a component are added to calculate the grade of the component. Finally, the weights of each component are multiplied by its respective grade and the results are added to obtain the score of the country. The alternative with the highest score is called the target country, the following is called the alternative country, and continuing in order of importance, the remaining alternative is named the contingent country. Table 4 summarizes the ranking of the alternatives for each company. The table only includes the target, alternative and contingent countries of the five countries selected by each company, in order to make the table comprehensible. Costa Rica, Ecuador and Guatemala are not included in the table because none of them were selected as target, alternative or contingent country.

6.2. ANP model for the selection of export markets

To validate the relations of influence of the network we brought together a panel of experts in foreign trade, whom evaluated each one of the influence relations that we identified previously.

Table 2. Components and criteria of the models

Component	Criteria	Relevance
Economy	Sector's GDP $	Shows a general scenario of the IT sector participation within the total GDP and the purchasing power of the country.
	Inflation %	
	Devaluation %	
Political stability	Country risk	Addresses the risk of breaking in a market.
Foreign trade	Exports from Colombia	Represents the bilateral trade of software services and the international competition to enter the market.
	Main suppliers	
Logistic	Calling cost per minute	These are operational costs of exporting software services, or cost of providing support to the users of the software purchased.
	Flight duration (hrs)	
	Ticket cost (1 week)	
Trade policy	Trade agreements	Provides information on barriers and benefits that has the software services sector in the country under study.
	Taxes	
	Intellectual property	
Market	Target population	Aims to measure the size of potential market and the software services sector in the country, besides of quantifying aspects that affect directly the profitability of exporting and the risk of penetrating
	Public price	
	Pirate price	
	Main competitors	
Company's experience	Exploratory exports	Examines the company disposition toward exporting and whether it meets the market requirements.
	Quality certificates	

The final network structure that we ended up with is shown in Figure 7 and Figure 8.

The judgments of the experts in foreign trade generated the weights of the merits shown in Figure 7, the C.R. for this comparison was 0.017, indicating that the comparison were done coherently. The opportunities had the highest weight, followed by the benefits, cost and risks. According to the analysis of the experts the opportunities should have a higher weight than the benefits because the markets evaluated, for most of the companies, have not been explored yet, and the risks should outweigh the costs because of the same reason.

Each criterion was assigned to one of the subnets of the merits to shape the four networks shown in Figure 8. The component with the alternatives are not included in the subnets to make the figure understandable, anyway in the four subnets the component with the alternatives influences the other components in the network and vice versa.

The dependence relations among criteria in each of the subnet are shown in Figure 8. The dependency relations appear as they do in the software Super Decisions, therefore, the origin of the arc represents the component that is being influenced and the arrow of the arch represents the component that influences.

In the subnet of benefits trade agreements influence on quality certificates, this happens because in the trade agreements the countries are making demands on certificates of origin for products and services, thus increasing the requirements of certificates for the service that the company sells. Moreover, the quality certificates that the company have do not influence on the trade agreements signed by the countries, thus there is no arrow in the opposite direction.

In the market component of the opportunities subnet exist an innerdependece loop, which represents that public price exerts an influence on target population because the service cost determines the segment of the population that can buy it. Target population, public price and exports toward Colombia influences on Sector's GDP because the market valued of the IT sector equal to total consumer and investment spending, plus the value of exports, minus the value of imports. All the criteria in the subnet influences on exploratory exports, the group of experts believed that the public price, the target population, the sector's GPD and the exports from Colombia affect the decision of making an export to some country.

In the subnet of costs there is only one relation of influence where flight durations influences on the ticket costs and vice versa. On the other hand, taxes are not influenced by the logistic costs because there is no reason for them to influence the taxes charged in the country, thus there is no arc directed to the logistic component.

In the risks subnet main competitors in the market depend on the country risk and the respect of the intellectual property. At the same time the main competitors depend on the economic conditions, as inflation and devaluation, and the main suppliers or the countries that provide software services to the market.

Table 3. International market selection matrix

Countries	Weight	Guatemala
External market analysis		
1.- Economy	0,10	
Sector's GDP $	0,30	U$82.5 Millions
Inflation %	0,35	8.75%
Devaluation %	0,35	0%
2.- Political stability	0,13	
Country risk	1,00	BB
3.- Foreign trade Demand and supply	0,11	
Exports from Colombia	0,45	
2.005 USD		14800
2.006 USD		16500
2.007 USD		17100
Analysis of the international competition	0,55	
Main suppliers (countries)		Mexico, USA, Costa Rica
Objective market selection		
4.- Logistic	0,18	
Calling cost per minute	0,30	$ 2.400
Flight duration (hours)	0,30	8
Ticket cost (1 week)	0,40	US$ 1500,00
5.- Trade policy	0,13	
Taxes	0,30	None
Trade agreements	0,40	TLC-1985
Intellectual property	0,30	Intellectual property law.
Objective market analysis		
6.- Market	0,22	
Promotion		
Target population	0,20	1000 companies. It is not a stable market.
Competitors		
Main competitors	0,30	Little competition within the international market. They usually sell packages to consumers and the sales strategy is passive.
Prices		
Public price	0,20	Variable prices between $3.000 y $2.5 mm.
Pirate price	0,30	0,81
7.- Company's experience	0,13	
Exploratory exports	0,60	$ 0
Quality certificates	0,40	0

Fuente: Studie of TPO for sofware services of companies registered in the programs of countries: Cost Rica, USA, Chile, Brasil y otros.

Table 4. Results of the TPO model

Company	Argentina	Brazil	Chile	USA	Mexico	Venezuela	Peru
1							
2							
3							
4							
5							
6							
7							
8							
9							
10							

Target country	
Alternative country	
Contingent country	

Figure 7. ANP model control level

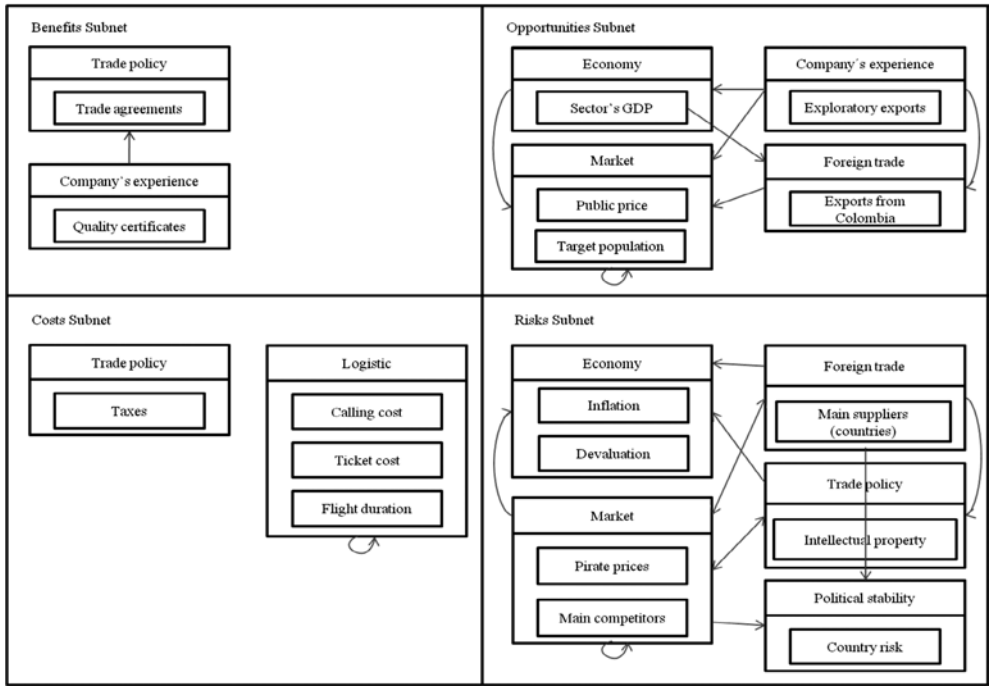

Figure 8. ANP model decision level

Table 5. Results of the ANP model

Company	Argentina	Brazil	Chile	Costa Rica	Guatemala	USA	Ecuador	Mexico	Venezuela	Peru
1										
2										
3										
4										
5										
6										
7										
8										
9										
10										

Target country	
Alternative country	
Contingent country	

The main suppliers and intellectual property are issues that are influenced by the competence in the market, depending on the degree of competition in a market there can be generated protectionism policies related to imports or related to intellectual property. Additionally the characteristics of the competitors and the quality of the intellectual protection policies influence the level of piracy of the software market.

The information used in the TPO model is the same used in the ANP model, but in this case the information is used to assign the judgments in the pairwise comparison matrices by the company owner or owners with the help of a consultant. It is important to notice that the C.R. were less than 0.1 for all the comparison matrices, that confirms that the comparison where done conscientiously. Table 5 summarizes the ranking of the alternatives for each company; the table only includes the target, alternative and contingent countries.

We used the additive negative formula to make the synthesis of results in Super Decisions. As mentioned earlier this software besides providing the countries raking also allows making sensibility analysis as shows Figure 9. This figure represents the sensitivity analysis for one of the companies in the study. As shown in Figure 7, the opportunities have a weight of 0.43. Fixing the weight of the merit in that value USA should be the target country and Venezuela and Guatemala, the alternative and the contingent country, respectively. This is a good tool to observe how the ranking of alternatives behaves when making small changes in priorities weights.

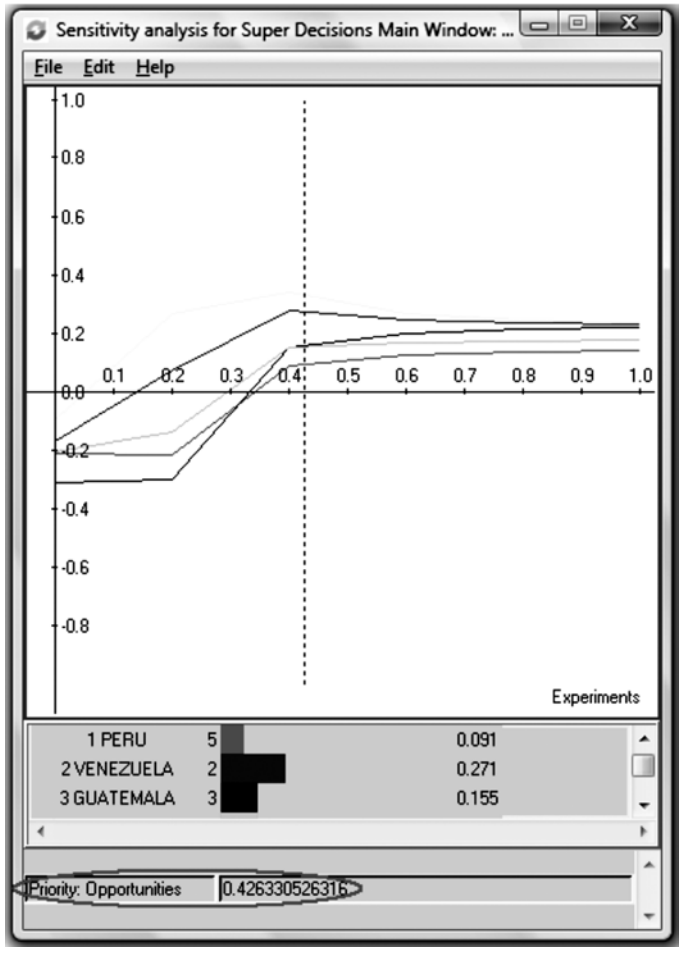

Figure 9. Super Decisions sensitivity analysis

Fuente: The Company of this studies of countries: Perú, Venezuela, Guatemala.

7. Comparison of the results obtained with the ANP model and the TPO model

Upon comparing the market selection model of the TPO with the ANP model, we identified that the results of both models are similar in the ranking of the countries. Table 6 shows the resulting target alternative and contingent countries for the companies involved in the study when applying the TPO model and the ANP model. The countries in orange indicate that the country got the same ranking in both models.

The results indicate that at least two countries match in the top three raking of both models when analyzing the same company, but not necessarily in the same position. Even thought results are similar; we concluded that the proposed model is better because it has a structured methodology to assign weights that allows evaluating the consistency of the weights allocated to the selected criteria. Besides, we also preferred it because allows analyzing sensitivity to changes in the priority weights. The results of the ANP model generate more confidence than the results of the TPO model because the subjectivity is reduced. The drawback of the ANP model is that the feedback structure generates pairwise comparison matrices that are difficult to interpret, making complex the judgments assignation for the company owners and the panel of experts. The ANP model feedback structure also generates many pairwise comparison matrices making the judgments assignation process a wasteful task.

8. Conclusions

We chose the ANP model to select export markets for letting check the consistency of the weights assigned, for letting make sensitivity analysis and for reducing the subjectivity in the weights assignation process. It would be interesting to analyze the results that can be obtained with the AHP model as it would reduce the amount of pairwise comparison matrices by only considering the influences on elements of higher levels and simplifying the structure of the decision problem to a hierarchy, as shows Figure 3. Although the AHP makes some independence assumptions among criteria, it could be a good choice to select the best export market as it also offers the advantages of letting check the consistency of the weights assigned and letting make sensitivity analysis. The complex judgments assignation would also be reduce as the lower level elements depend only on higher level elements (Saaty T. L., 2001, p. 180).

Colombia has competitive advantages in the IT sector: the human resource is qualified; salaries are low, exception of taxes for new software products, among others (Fedesoft, 2004). These conditions offer opportunities for being competitive in the international market and the ANP model offers help to company owners in order to make informed decisions to select the best exports markets. The best markets are those that increase the opportunities of selling the service and reduce de risk of failing the export process.

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Table 6. Comparison of the results

	TPO model			ANP model		
Company	Target	Alternative	Contingent	Target	Alternative	Contingent
1	Brazil	Peru	Venezuela	Brazil	Venezuela	Ecuador
2	Peru	Mexico	Chile	Chile	Mexico	Venezuela
3	Peru	Chile	Venezuela	Chile	Venezuela	Argentina
4	USA	Peru	Venezuela	USA	Venezuela	Costa Rica
5	Brazil	Peru	USA	Brazil	USA	Mexico
6	USA	Peru	Chile	Chile	USA	Venezuela
7	Brazil	Peru	Venezuela	Brazil	Venezuela	Peru
8	Peru	Mexico	Venezuela	Mexico	Guatemala	Venezuela
9	Peru	Venezuela	Argentina	Peru	Argentina	Guatemala
10	USA	Peru	Venezuela	USA	Venezuela	Guatemala

Fuente: Saaty T.L. 2005 .

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