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APPLICATION OF ANALYTICAL NETWORK PROCESS IN FORECASTING AUTOMOBILE SALES OF FIAT 500 L

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This paper describes the application of Analytic Network Process (ANP) in the modeling and analysis of various factors and the impact on the forecasting processes in situations when there is a need for the integration of contextual information, which is the result of sudden and unpredictable changes in the environment in which the company operates. The model is applied on a sample in forecasting the sale of a new model automobile Fiat 500 L, and is based on the professional knowledge of experts in automobile market trends, the actual current and projected trends in automobile sale and subjective evaluations of the authors, and in the context of the global economic crisis which significantly affects automobile sale in the world market.

Keywords: sale, forecasting, automotive industry, the analytical network process

JEL Classification: C51, C53, D81,E27, F47

INTRODUCTION

Considering that the global economy operates in conditions of a high risk and uncertainty, caused by the global economic crisis, the forecasting of automobile sale, especially of new models, presents a complex, multidimensional and multi-criteria problem, which also requires a methodology of an appropriate level of complexity.

The research subject in this paper deals with the possibility of using the Analytic Network Process (ANP), as a multi-criteria method for decision support in the process of forecasting the sales of a new automobile model – FIAT 500 L.

The starting hypothesis is that the current projections and forecasting sales, which have been done by the FIAT professional-service corporation, can successfully be corrected by the given estimation using the ANP demand forecasting model, which, ultimately, should result in more accurate forecasting.

The aim of the research is to reduce uncertainty and create the preconditions for forecasting the optimization process based on the application of the ANP model through the integration and coordination of contextual information, which cannot adequately be incorporated by using the quantitative forecasting methods (primarily time series). The application of the ANP forecasting on the example of the automobile

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industry could contribute to a better understanding of its functioning in the global environment, especially in times of a crisis and recession and bearing in mind their interdependence.

When it comes to the sales forecasting of new products, the lack of historical information favors the use of qualitative forecasting methods. The important, essential advantage of qualitative forecasting methods in relation to quantitative forecasting methods lies in their potential to forecast changes that may occur in demand for a new product, and, implicitly, in the range of its sale.

Although the ANP model is based on subjective assessments characterized by a successful application in many areas of forecasting, the ability to rapidly incorporate feedback and a possibility of simple comparison to actual results . The structure of the paper is organized in the following way: in the second part which consists of two sections, a review of the literature concerning the problem of forecasting automobile sale has been given, along with a brief description of the processed problems and the used forecast methods, as well as a review of the relevant references relating to the application of the Analytic Network Process, with a special overview on the forecasting area, whose theoretical and methodological framework for solving the analyzed forecasting problem is defined. In the third part of the paper, firstly, the ANP method is described and then applied to a specific case study. The Analytical Network Process in the literature is suggested as a solution for large, dynamic and complex problems of multiple criteria decision-making, such as the strategic planning of organizational resources, the evaluation of strategic alternatives and an opportunity of introducing new manufacturing technologies. These problems include numerous, both quantitative and qualitative factors, then many interactive attributes (economic, social, political, cultural, etc.) and complex relations between them. All these problems mostly rely on measurement and relations in the process of multi-criteria decision-making and are based on the estimation of managerial preferences. One such problem is forecasting, which includes a number of interrelated and often conflicted factors and dependencies that need to be taken into account in order to make an optimal business decision.

Finally, the model results are presented together with a postoptimal analysis, as well as the conclusion, with possible indications for a future research.

LITERATURE REVIEW

Due to the possible implications for consumption and the economy in general, forecasting the sale of durable goods such as automobiles has a great significance, especially concerning that the automotive industry has the key role in many economies and presents their main driving force and is the generator of their economic growth and development. Demand for automobiles significantly affects the trends in travel and tourism, the development of the transportation infrastructure and residential patterns (Ebu Eisheh & Mannering, 2002), and all these activities contribute to economic expansion and the opening of the new jobs. On the other hand, economic expansion puts pressure on politicians, economists, urban planners and traffic engineers, to be aware of the trends in demand for automobiles and that incorporate the feedback from them into their plans and projects. Buying an automobile is a critical consumer decision influenced by many psychological, sociological and economic factors, in both developed and developing countries. (Abu Eisheh & Mannering, 2002).

In an attempt to better understand the movement of the automotive market and the future of the automotive industry, recent studies and the analysis cite three key factors determining the volume of automobile sale: the purchasing capacity of the population, the borrowing capacity and motivation for buying automobiles, also emphasizing the factor of the so-called restrained demand, which should be taken into account during forecasting automobile sale, especially after a period of a major falling sale caused by global crises (Plache, 2011). The automotive market has a large part on the market for consumer durable goods, and companies that manufacture automobiles cannot eliminate the need to forecast the sale of new models (Kahn, 2002), regardless of the uncertainty present in their development and marketing and objective constraints, which, in addition to unrealistic expectations, often lead to misjudgments and great losses. In his automotive

market research, Karlson and Umble (1980) forecast demand for automobiles in the period from 1979 to 1983 by classifying automobiles into five categories: sub-compact, compact, intermediate, standard and luxury. The authors tried to establish the nature of the relations between gasoline prices and other relevant factors and the automobile sale, concluding that the sale of compact vehicles grew faster (from 35 to 45 percent) than the sale of other types of automobiles. They also established the fact that the economic conditions were the main determinant of a future automobile sale. The study indicated the dependence on the gasoline prices and automobile sales. However, the study was limited to two independent variables in an attempt to forecast the sale during a difficult political period (the hostage crisis in Iran and the oil embargo). For the same reason, Harris (1986) also analyzed the impact of certain economic variables on the automobile sale and found a significant correlation between demand and some economic variables. Garcia-Ferrer et al (1997), use the ARIMA model to forecast automobile sale, in an effort to evaluate the performance of different forecast methods. The model of the National Road Traffic Forecasts (NRTF) Romilly (1995) includes a model based on the household and explanatory models. Both models use a combination of time series involving causal variables. The multi-criteria approach in forecasting sale was suggested by Chang et al (2007), through the development of fuzzy neural networks, Kuo (2001) and Thomaseo & Fiordaliso (2006), which are using clusterization and essence for forecasting the complexity of the environment.

Review of the ANP applications

The Analytical Network Process (Saaty, 2001), as an extension of the Analytical Hierarchy Process (Saaty, 2010), can be used in solving the problem of choosing under the conditions of uncertainty or as a forecasting instrument. The problem of choice usually involves the preference evaluation of the alternative courses of action, while forecasting using the AHP/ANP focuses on performing the relative distribution of probable future outcomes. These forecasts are then used when the alternative courses of action are evaluated. The review of the ANP applications published in scientific journals (Graph 1) shows that the largest number of these applications were dedicated to solving the problem of strategic decision-making (28%) (mainly the problem of the evaluation and selection of optimal business strategies and supply-chain strategies), and to a lesser extent to the resolving of political problems and conflicts between individual countries and companies, too.

The successful application of the Analytic Hierarchy Process (AHP) and their extensions, the Analytical Network Process (ANP) in economic forecasting was demonstrated by Saaty (2001), Gholam-Nezhad (1995), Saaty & Gholam-Nezhad (1981), Blair et al (1987), Blair & Saaty (2010), Saaty (2005), Niemira & Saaty (2004), Yűksel (2005), Azis (2010), Voulgaridou et al (2009) an so on. In support of the AHP application in forecasting, the emphasized AHP advantages reflected in the ease of use and a great possibility of an assessment specification, performed by the consistency test. Saaty and Vargas (1991) analyze the application of the AHP in forecasting oil prices and forecasting exchange rates.

In addition, the Analytical Network Process has proved very successful in ranking and selecting projects, as demonstrated by Meade & Presley (2002), as well as Lee & Kim (2000), then in strategic decision-making, Sarkis (2003) and production planning Karsak et al (2002), optimal planning, Momoh & Zhu (2003) etc. A

Graph 1 Viewing ANP applications

Source: Voulgaridou et al, 2009, 40

good review of AHP applications is given by Vaidya & Kumar (2006). Voulgaridou et al (2009) demonstrate the use of the ANP in forecasting the sale of a new product, emphasizing the multiple criteria nature of the problem and the difference between sales forecasts in general and new product sales forecasts, which characterizes a limited amount of information, time available for an analysis and uncertainty in terms of the market response to such a new product.

METHODOLOGY

Analytic Network Process

The Analytical Network Process (ANP) is a method for decision support, developed by Thomas Saaty (2001), and allowing the involvement, quantification and objectification of all relevant, tangible and intangible factors in the decision-making process, as well as all the existing influences between decision criteria and alternatives. (Jharkharia & Shankar, 2007). Generalizing the access of supermatrice, introduced in the AHP concept, the ANP allows interactions and feedback within and between the components of the model: in clusters (the inner dependence) and between clusters (the outer dependence). This feedback successfully includes complex relations, especially in the cases of risks and uncertainties. An ANP model consists of two parts. The first part consists of a hierarchical control or a network of criteria and sub-criteria controlling interactions in the studied system. The second part is the influence network , amongst the elements and clusters, whereby one ANP model can have one or more networks. Furthermore, the problem is often studied through a control hierarchy or a system which consists of benefits, costs, opportunities and risk. The synthesized results of the four control systems are combined by calculating the ratio between a product's benefits and possibilities and such a product's costs and risks in order to determine the best outcome.

The procedure of applying an ANP model of decision-making is carried out in five steps (Saaty, 2001):

- the decomposition of the problem – A decision problem is decomposed into its main components.
- the cluster formation for the evaluation – After defining the decision-making objectives , it is also necessary to generate clusters for the evaluation purpose by a criterion, sub-criterion (if it is possible) and cluster alternative.
- the structuring of the ANP model – The ANP is applied to different decision-making problems in the field of marketing, health, politics, military issues, society, predictions, etc. Their accuracy of forecasting proved in impressive applications in the field of economic trends, sports events and other events, whose outcome became known later.
- a paired comparison and prioritization – In this step, it is necessary to compare the pairs of elements of decision-making as well as the synthesis of priorities for all the alternatives. When such a paired comparison in the ANP model is made, questions are formulated in terms of domination or an impact, which is the central concept in the application of an AHP/ANP methodology. If a registry element is known, which of the two elements being compared in relation to it have a greater impact (it is more dominant) in comparison to that registry criteria? Or, in the case of an existing feedback, which of these two elements is under a higher influence of the registry criteria? The estimations are made by a fundamental scale 1-9 (Table 1), which the comparative study showed simulate human thinking most adequately.
- the sensitivity analysis of the solution – It is finally possible to make a decision and carry out a sensitivity analysis in terms of the impact which, according to the importance of some criteria or sub-criteria, a final outcome has on a given solution ; it is also possible to determine how big or small these indicators are through an analysis.

Problem description and the construction of ANP model

The model of the Analytical Network Process is applied to the problem of forecasting a sale for a new automobile model Fiat 500 L. As they say in FIAT, the model 500 L combines the inherent characteristics of the different classes of automobiles, with an aim to

Table 1 The scale of relative significance 1-9

Intensity of Importance	Definition	Explanation
1	Equal Importance	Two activities contribute equally to the objective
3	Moderate importance	Experience and judgment slightly favor one activity over another
5	Strong importance	Experience and judgment strongly favor one activity over another
7	Very strong or demonstrated importance	An activity is favored very strongly over another; its dominance demonstrated in practice
9	Extreme importance	The evidence favoring one activity over another is of the highest possible order of affirmation
2, 4, 6, 8	Mean values between two adjacent estimates	When compromise is needed
Reciprocals of above	A reasonable assumption	If activity i has one of the above nonzero numbers assigned to it when compared with activity j, then j has the reciprocal value when compared with i

Source: Saaty & Kearns, 1985, 27

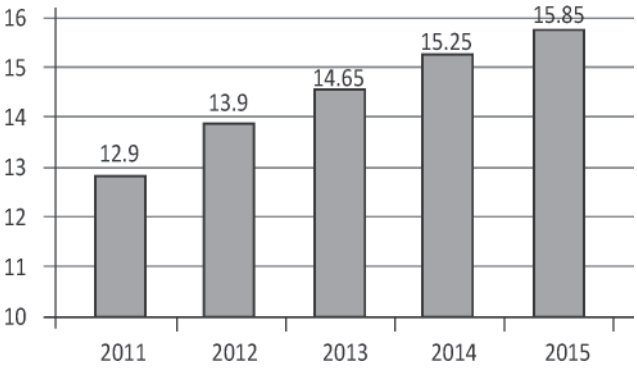
offer a distinctive and versatile vehicle that would be an alternative to the traditional models of the B and C classes. The label "L" summarizes the three key dimensions, which represent a step forward in relation to the model FIAT 500: the size (*Large*) i.e. a large, functional and efficient space, light (*Lightness*), the use of friendly and ecological technologies making life easier and better, and adjustable surrounding (*Loft*), design allowing it to live a life to the fullest. The estimated sale of the FGA (Fiat Group Automobiles), contained in the plan presented by Sergio Marchionne, executive director of Fiat Corporation, was 2.7 million vehicles in 2012, 3.4 million vehicles in 2013 and 3.8 million in 2014. The main target markets for 2014 are the European one, with the expected sales of 2.15 million passenger and commercial vehicles; Latin America with the expected 1.125 million vehicles; Turkey, with 90,000 vehicles; China with 300,000 vehicles (2% market share); India, with 130,000 vehicles (5% market share) and 105,000 vehicles (Fiat and Alfa Romeo) that sold in the United States, produced by Crysler.

In mid-2012, at the Geneva Motor Show, Fiat introduced a new model, Fiat 500 L, which will serially be produced in the city of Kragujevac, in the Republic of Serbia. The intention of the Turin automobile giant was to improve its position by launching this model in the U.S. market, where the sale of the previous model 500 does not go according to the plan and where FIAT has unsuccessfully been trying to make a breakthrough for decades. Probably, the reasons for the failure of the model "500" lie primarily in their unrealistic expectations, considering the poor indicators of the world economy inevitably influencing the automotive industry, too; among them, there are, however, as it turned out, FIAT's organizational problems, such as an inadequate dealer network, delays in production, a delayed marketing campaign and a poor security rating, which proved to be the key issues of such a relative failure of the Fiat 500 model in the U.S. market. Let us remind you that the planned production of the Fiat 500 L model, initially planned 25000-35000 vehicles per year, with the expectation that, in 2013, the number of those vehicles will increase to a total of 150,000 or even 200,000 vehicles. Considering also the fact that the sale of the older FIAT 500 model had primarily been forecast to be of 50,000 vehicles per year and that the actually accomplished sale was 20,000 vehicles, the forecasting of the sale of the new model clearly cannot be based on the expected or projected trends, especially when having in mind the organizational problems FIAT is being faced with, as well as the sensitivity of the automotive industry to global economic trends. The

product range of passenger and commercial vehicles of the FIAT Group, ending June 2012, and in a relation to the same period in 2011, recorded an absolute decline in sale from 929,366 vehicles to 839,754 vehicles, which is a decrease of 9.64% (Table 2). On the other hand, the estimated automobile sale for the period from 2011 to 2015 (Graph 2), as well as the forecasting of the sale of the world's eight largest automakers for August 2012 (Table 3), are indicative of optimism in the assessment, which could be explained by positive economic trends in the U.S., increasing demand in China and India and the expectation that these trends will continue in the future, which cannot be ignored, either.

Starting from the given theoretical assumptions and the description of the problem, as well as the real situation in the environment, the appropriate ANP model forms with the structure presented by ANP network clusters, elements and the impact between them, whose validity has been verified, are based on expert analyses (available on the Internet):

- The ENVIRONMENT Cluster, which includes external factors that may affect the sale of vehicles including: customers, competition, the global financial crisis and technology. When FIAT 500 L starts being sold at the beginning of the year 2013, as announced, it will have a direct competitor on the Mini-Cauntr yman model, for which it has been announced that it will be similar in size, and will have 20ks more.



Graph 2 Prediction of car sales in the 2011-2015

Source: http://www.edmunds.com

Table 2 Navigating monthly sales of passenger and commercial vehicles of the FIAT group, including the second quarter of the year 2012.

2012	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	TOTAL	
Italy	39.716	36.237	35.279	40.154	45.849	38.882							236.117	-20.29%
France	4.963	5.574	6.444	5.024	5.026	3.179							33.210	-25.62%
Germany	5.849	6.055	9.291	8.370	9.078	8.595							47.238	-9.29%
Spain	1.514	2.340	2.706	1.961	2.150	2.588							13.259	1.89%
UK	3.522	1.724	10.904	4.529	4.923	5.647							31.249	5.52%
Europe	11.068	11.730	13.283	12.562	12.344	14.580							75.567	-18.18%
Brazil	42.366	43.393	51.109	41.430	45.865	63.530							287.693	-0.58%
Russia	1.008	1.002	1.154	144	269	476							4.053	-72.02%
India	2.101	1.704	1.415	1.000	1.002	805							8.027	-30.71%
Turkey	1.335	2.866	3.966	4.010	4.663	4.431							21.271	-30.13%
Mexico	520	238	395	319	460	477							2.409	144.07%
Argentina	12.726	6.050	8.740	6.657	8.184	6.407							48.761	12.97%
Japan	376	762	1.345	652	828	1.307							5.270	35.06%
USA	1.911	3.227	3.712	3.849	4.003	4.004							20.706	318.81%
Canada	321	533	1.207	1.211	810	839							4.921	92.23%

Source: http://www.carsitaly.net/fiat_auto.htm

Table 3 Estimated sales of the world's eight largest automakers in August 2012

Manufacturer	August 2012 Forecast	% Change vs. July 2012	% Change vs. August 2011
Chrysler	142,593	13.1%	9.6%
Ford	191,456	10.4%	9.5%
GM	227,087	12.8%	3.9%
Honda	133,458	14.1%	62.1%
Hyundai/Kia	117,212	6.5%	17.6%
Nissan	97,022	-1.3%	6.0%
Toyota	182,896	10.9%	41.3%
Volkswagen	47,069	-3.4%	32.8%
Ukupno	1,255,392	8.9%	17.2%

Source: http://blog.truecar.com/2012/07/26/july-2012-new-car-sales-expected-to-be-highest-july-since-2007-according-to-truecar-com/

- The MARKETING MIX Cluster that includes the features of a product, i.e. vehicles, the price, its promotion and distribution. (According to a comparative analysis carried out by the competition, to:http://wot.motortrend.com/2012-geneva-2013-fiat-500l-looks-ready-to-tackle-the-mini-countryman-176827.html)
- The ALTERNATIVES Cluster, which makes the possible levels of sale: low (below the expected lower limit of 25,000 vehicles), expected (from 25,000 to 30,000) and high (35,500 and even more).
- The COMPANY Cluster, which includes the manufacturer's features which can objectively affect the sale of vehicles. In the case of the older FIAT 500 model, the factors such as the dealer network and production organization were shown to have greatly influenced the sale of 20,000 vehicles of this model in 2011, which was significantly lower than the estimated 50,000. On the other hand, it is about the automobile manufacturer of a recognizable image and identity, so it is yet another factor needing to be taken into account.

Between and within these clusters, there are interactions, i.e. impacts, which, in our opinion and on the basis of the previously mentioned studies and the available expert analysis, should be taken into consideration when comparing pairs:

- between the ENVIRONMENT cluster and the ALTERNATIVE cluster, there are two-way dependencies;
- between the MARKETING MIX cluster and the ALTERNATIVE cluster, there are two-way dependencies;
- between the MARKETING MIX cluster and the FEATURES OF THE COMPANY cluster, there are two-way dependencies;
- the MARKETING MIX cluster is under the influence of the ENVIRONMENT cluster;
- the ALTERNATIVE cluster is influenced by the FEATURES OF THE COMPANY cluster;
- a network dealer has an impact on the marketing mix as well as the customers;
- within the MARKETING MIX cluster and the ENVIRONMENT cluster, there is an internal dependency.

Model results

In Figure 1, we can see the ANP forecasting model of selling the FIAT 500 L automobile, whose structure forms the clusters, elements and relations between them. These relations presented by the arrows, are indicative of the direction of an influence between the model elements defined during structuring and modeling problems. Comparing the pairs of the model elements, each cluster or elements within the same cluster, or between different clusters, is normally made by using the scale of comparison ranging from 1-9 (Table 1). Pair comparisons are basic for an AHP/ANP methodology. When certain pair factors are compared, a relative importance ratio can be determined, the preference or probability of these factors, depending on a need. This ratio represents the relation between two factors being compared. In some situations, it will be a subjective assessment; in others, however, a

comparison is possible. Such questions and answers in both directions help determine the real priorities of decision-makers, for all elements in the problem.

When assessments for each segment of the model are entered, the information is synthesized in order to achieve the general preference of alternative outcomes. This synthesis generates a report ranking the alternative (outcomes) in relation to their overall objective. The report may include a detailed ranking accounting for the manner in which each alternative is evaluated in relation to each criterion.

Since all the necessary comparisons have been done in accordance with theoretically established principles, and after performing calculations via the Superdecisions software package developed as a software application support for the ANP, the following result has been obtained in regard to the rank-determined order of alternatives:

Table 4 The resulting priorities and rank alternatives, i.e. alternative levels of sales of Fiat 500 L

Alternative (sales level)	Totals	Normalized	Ideal value	Rank
1 Low	0.1219	0.3430	0.9446	2
2 Expected	0.1290	0.3631	1.0000	1
3 High	0.1044	0.2939	0.8095	3

Table 4 provides a possible sequence of alternatives according to the rank, and the obtained alternative priorities are interpreted in terms of the probability of achieving the estimated sales volume. We can see that the highest estimated probability of achieving has the expected sales volume (36.3%), then low volume (34.3%), and finally a high-level sales volume (29.4%). Small differences in the percentages indicate a high level of uncertainty existing in the process of forecasting and consequently, decision-making, which

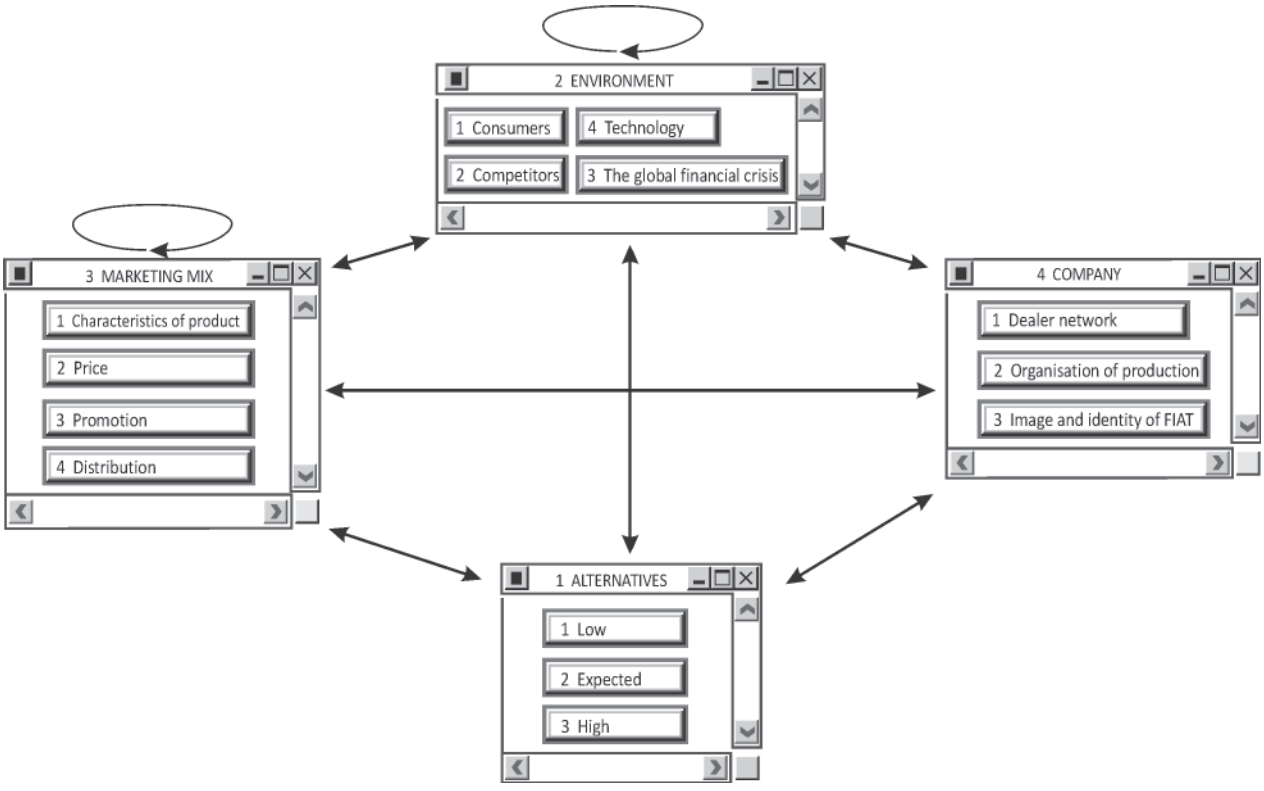


Figure 1 ANP model for forecasting sales levels of FIAT 500 L

only confirms the need for an additional sensitivity analysis of the results to the changes in the value of the key model parameters, in order to obtain a complete and comprehensive assessment of the target value.

The Idealized value column shows the results divided according to the highest value, so that the highest rank has priority 1.0, while the others are in the same proportion as in Normalized value the column. The sensitivity analysis of the results by changing the level of element significance of the higher level, i.e. the register elements, may more or less significantly affect the order of importance and the evaluation of the observed options, showing what an alternative performance in terms of each criterion is, as well as how these alternatives are sensitive to changes in the decision process criteria.

Thus, Table 5 clearly accounts for the fact that the growth of the relative importance of the competition criteria, ranging from 0.0001 to 0.9999, affects the probability of an alternative sales volume to some extent: the probability of the low level of sales increases from 34.2% to 34.6%, and the probability of the expected level decreases from 36.7% to 34.2%. Simultaneously, the probability of a higher level of sales increases, no matter how paradoxical it may seem, is not unusual, because actions and competitors' success are what the success of the Fiat 500 L model largely depends on.

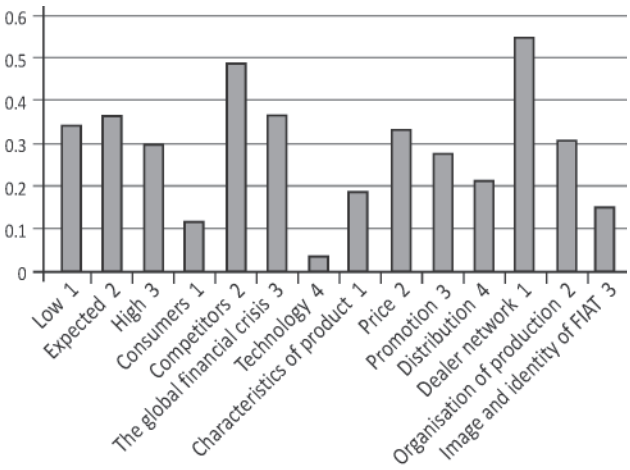
Table 5 Sensitivity Analysis of results: The impact of changes in the relative importance of the Competitors criteria on the resulting priorities of alternatives - possible levels of sales

Input value	Matrix: The Competition	1 Low	2 Expected	3 High
0	1.00E-04	3.42E-01	3.67E-01	2.90E-01
0.2	2.00E-01	3.43E-01	3.62E-01	2.95E-01
0.4	4.00E-01	3.44E-01	3.57E-01	2.99E-01
0.6	6.00E-01	3.45E-01	3.52E-01	3.03E-01
0.8	8.00E-01	3.45E-01	3.47E-01	3.08E-01
1	1.00E+00	3.46E-01	3.42E-01	3.12E-01

Graph 3 shows the derived priorities of all the model elements just as they appear in supermatrices (the limited column). Thus, it is estimated that the dealer sales network criteria have the biggest impact on the evaluation of the alternative levels of sales (0.54445), which significantly determined the placement of the previous FIAT 500 model, only to be followed by the competition (0.48438), the global financial crisis (0.36487) etc.

CONCLUSION

In the paper, one possible multiple criteria approach is suggested to forecast the sale of the new FIAT 500 L automobile model, based on the Analytical Network Process, as a supporting method of multi-



Graph 3 The resulting priorities of alternatives and criteria

criteria decision-making. The reason for this is the fact that forecasting the sales automobiles is a complex, multi-criteria problem which due to limited pieces of information and trends in the global automobile market is characterized by a high level of uncertainty. The strong competition and changes in the affinities of the purchaser, in other words –the automobile buyer, requires not only a quick response, but also the ability to forecast future trends in order to create an appropriate business strategy. In such circumstances, the existing approaches based on statistical forecasting

methods frequently do not generate satisfactory results. Despite certain limitations, primarily related to the subjectivity of assessments and the time needed to have all these assessments performed, the ANP approach allows decision-makers to structure the influence various factors have on the final outcome of the forecasting process and to document it in a manner that can be presented to all stakeholders. The results obtained in the model are comparable and consistent with the estimated ones. More objectivity and a forecasting value would be achieved if the estimates via an ANP model are done at the management level of the FIAT corporation, which was impossible in this case; however, the validity of the results can practically be verified at the end of the forecast horizon.

The results may have their practical implications; in terms of methodological support to managers in the automotive industry, on the basis of the formal models of forecasting/decision-making, they can better understand the environment they operate in and make better strategic decisions. The theoretical implications are reflected in the fact that the confirmed effective capacity of the Analytical Network Process to conceptually include all the relevant factors out of the forecasting context/decision-making and despite usual limitations encountered during the application of qualitative forecasting methods (precision, lack of information, bias, price, etc...), can serve as a satisfactory base for the creative solution of a decision-making problem in situations of increasing complexity and uncertainty, when one needs to quickly make a decision.

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