Importance of the Enterprise Risk Management

Practice for Airline Management: ANP-based Approach

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Abstract

Airlines are exposed to risk which may effect operations, customers, corporate value, security and safety. Risk can also be introduced to an enterprise through air transportation industry-based and organization-based changes each of which may also bring changes in the type of risk. These present and raising risks main reason of growing importance of enterprise risk management (ERM) implementation in the airlines. ERM becomes focus point in the successful airlines across the world. This interest should be airlines in the Turkey if they want to be in the hard airline market conditions. This study aims at the introducing to four aspects of ERM implementation: benefits, opportunities, risks and costs that call attention to the ERM implementation in the airlines as managerial approach at the Turkey. Airline manager's consideration will enhance and increase about importance of ERM by this study. Analytic Network Process (ANP) is used as a qualitative technique for ERM implementation decision at airline management

Keywords: Airline Management, Analytic Network Process, Enterprise Risk Management

1. Introduction

As the dynamics of the air transportation market, business environment and changes in regulatory requirements for airlines increase in their complexity, it becomes harder to plot the right course for continued success. The abilities to identify and to adapt to changes are key success factors for the leaders of tomorrow. In the light of this, airlines are driven more than ever by the desire to protect their reputation and manage their risks effectively. ERM is provides a framework for airline management to deal effectively with uncertainty and associated risk and opportunity, thereby enhancing its capacity to build value. ERM does not operate in isolation in a corporation, but rather is an enabler of the management process.

Deregulation of air markets, combined with some other factors, has contributed to the growth and also volatility of demand in aviation markets. Additionally, the existence of a more competitive environment has also changed the industry, airlines and airports need to be more efficient in order to survive in the market. The capacity is rapid change by volatility. In general terms, it is the average year-to-year variation in traffic. Greater volatility of traffic means greater risk. If the clientele for an airport is uncertain, so are the revenues. The exact relationship between traffic and revenues depends on the current agreements with airlines and other users. The overall effect is nevertheless clear. Greater risk means higher costs of capital, higher interest charges (R. de Neufville and J. Barber, 2001).

Air transportation is a key strategic asset in that it provides access to markets and thereby enables the economic development of nations and regions (Bruno and Clarke, 2003).The airline industry has been through more structural changes in the past decade than most. The airline industry faces a number of risks in today's climate. Airlines are operates in a very competitive environment. Airlines face substantial strategic, financial, operational and hazard risks.

Airlines are exposed to the risk of catastrophic loss. Airlines are operates to the highest standards of safety and security and are work closely with all the relevant authorities to ensure that customer safety is paramount at all times. The airline industry is characterized by low profit margins and high fixed costs. The air transport business is sensitive to both cyclical and seasonal changes. Competition in the sector is intense and the decline in average ticket prices has been considerable due to over-capacity and the changed market situation.

The Airline Risk Management Survey 2005 was launched with the aim of gaining a better understanding of the issues and trends within airline risk management and to establish some industry benchmarks against which airlines can measure and monitor their own performance. For research breaking new ground among the airlines, the response rate was positive [degrees] 51 airlines took part, accounting for 41% of the world's top 200 airlines by total revenue (Airline Business, 2006). The study shows that risk management has a high profile within airline businesses: not only do two-thirds of airlines have a company-wide risk management strategy, which, on average looks just over three years into the future, overall responsibility for risk is taken at boardroom level in 75% of airlines, with the chief executive's office making the decision whether to avoid, retain or transfer risk in 45% of airlines.

Mercer Management Consulting analyzed aviation industry risks for the 10-year period from April 1991 to April 2001. The primary risks facing the industry fall into four categories: hazard, strategic, financial and operational. Overall, failure to manage these risks resulted in the evaporation of $46 billion in shareholder value. Interestingly, hazard events, including safety, liability and war, were the least likely to result in value loss. Strategic and financial risks were much more prevalent, accounting for nearly 75% of value loss events during the period (Zea, 1998).

The study is deal with solving "is ERM important to airline management and should ERM apply in the airline?" main problem. In this study, ERM effects are determined and listed in the 4 main categories as benefits, opportunities, costs and risks. They are ANP merits. ANP-based approach is selected to problem solving in this study. ANP is considered appropriate decision making tool for the ERM implementation decision. In recent years, there has been an increase in the use of ANP in multi-criteria decision-making problems. In the selection of a provider, the criteria are of both the types, subjective and objective. These criteria also have some interdependencies, which cannot be captured by the popular AHP method. Therefore, instead of using the commonly used AHP approach for solving such types of problems, I recommend the use of an ANP-based model for the decision making of ERM implementation in the air transportation. Prior case studies: Lufthansa, Continental, Delta, ANA, JetBlue, Finnair and SilverJet ERM practices are considered for the determination of ERM importance to airline management beside literature review and research. Also, many interviews are achieved with airline managers in Turkey.

The factors of ERM importance are not independent of each other, and moreover, there may even be a relationship among some factors. In this study, importance of ERM and its implementation decision is solved using the analytical network process (ANP), which allows measurement of dependency among ERM factors. At the same time, the ANP method is used in order to determine the factor weights of the dependency or independency and their effects on the selection of an alternative strategy.

I am determined that ANP literature is very narrow and limited about ERM field. So, this paper is contributed to ERM field by ANP-based approach.

This article divided into four sections. The following section presents importance of ERM to airline management. Brief review of ERM literature is given Section 2. Section 3 describes with research problem and the proposed ANP model application. Also, determined criteria are given in this section. The performed ANP model is explicitly given in this section. In this section, the results, their interpretation and the implementation of the decision are presented. The overall conclusion is given in the last section.

2. Background of Enterprise Risk Management

There is a huge amount of published on ERM. Many ERM frameworks are currently being used. While they may vary in name, industry and region, they share a common theme: importance of ERM implementation in related industry or organizations. Here is a brief description of most popular ERM frameworks that it can be useful to understanding of ERM importance and given decision of ERM implementation.

Basel Committee on Banking Supervision, Joint Forum working group report, August 2003: This report, based on a survey of 31 financial institutions in 12 jurisdictions, identifies and describes two key trends in the management of risks in the banking, insurance, and securities sectors: (1) greater emphasis on the management of risk on an integrated firm-wide basis and (2) related efforts to "aggregate" risks through mathematical risk models. The report does not attempt to define best practice and offers only limited quantitative data about industry practice, preferring to make a series of more general, qualitative statements in this emerging area of risk management. However, it offers a timely characterization of industry trends and many hints on regulatory thinking, as well as clear introductions to some of the key conceptual tools surrounding risk integration and economic capital.

Managing Risk: Practical Lessons from Recent 'Failures' Of EU Insurers: William McDonnell, FSA Occasional Papers, December 2002: In this report a working group of supervisors from 15 European countries dissect recent experiences of failed insurance companies and 'near misses' across the life and non-life sectors since 1996. The report also assesses supervisory practices aimed at prevention and advance detection. It concludes that internal management problems appear to be the root cause of every failure or near failure; firms need to anticipate how risks can interact in complex ways, including causal links between different types of risk (for instance operational risks and underwriting risk or claims evaluation risk) and unexpected correlations (particularly between certain asset and underwriting risks); and that it is important to strike the right balance between prescriptive rules, principles, incentives and diagnostic tools.

Taming Uncertainty: Risk Management for the Entire Enterprise: PricewaterhouseCoopers/Economist Intelligence Unit, July 2002. This briefing looks at the trend towards a holistic approach to risk management in financial institutions. It summarizes three key 'enablers' for enterprise risk management: board-level support; management processes that make the whole enterprise aware of risk; and putting the right people and systems in place to make sure

risk-aware decisions can be taken. The briefing also sets out ten attributes of a world-class risk management culture, summarizes UBS's approach to ERM in new product approval, and offers a broad-brush framework for the ERM process.

Creating Value through Enterprise Risk Management – A Practical Approach for the Insurance Industry: Tillinghast-Towers-Perrin, 2001: This long and ambitious concept paper by consultants at Tillinghast-Towers-Perrin looks at how enterprise risk management can be defined for insurance firms and offers a detailed framework for implementing ERM. It discusses the differences between banking and insurance ERM and offers a guide to developing ERM in the insurance industry. It discusses many of the specific problematic such as risk mapping, prioritization techniques such as heat mapping, and compares the main risk modeling techniques. The paper also compares financial risk modeling techniques developed in the banking industry, such as value at risk, to insurance industry techniques such as probability of ruin. It offers a five-step process to ERM strategy building and concludes with some illustrative vignettes on ERM in practice. Also from TTP, note this survey from 2000 that helped benchmark corporate attitudes to enterprise risk management.

Integrated Risk Management: A Holistic Risk Management Approach for the Insurance Industry: working paper, Dr. Andreas Müller, Munich, 1999. This paper takes a look at holistic risk management from a reinsurance perspective. It argues that, ultimately, an integrated risk management strategy will enhance shareholder value at insurance joint-stock companies. The paper claims that the field of 'integrated risk management' opens up an opportunity for reinsures to effectively position themselves in the market. It also argues that integrated risk management solutions are a fundamental pre-condition for the design of efficient insurance coverage – particularly as risks grow steadily more complex.

Survey on Enterprise Risk Management: Casualty Actuarial Society, 2001: This survey took the temperature of knowledge about enterprise risk management in the insurance industry. It found a lack of knowledge of important tools and concepts such as economic capital, Economic Value Added, Expected Policyholder Deficit, Extreme Value Theory, options pricing theory, Risk Adjusted Return on Capital, risk mapping and Value at Risk (even among those respondents who rate themselves as expert in or highly familiar with ERM).

How Safe is Safe Enough: An Introduction to Risk Management: is written by Angela Darlington et al., Staple Inn Actuarial Society, June 2001. This easy-to-read overview of problems and issues in holistic risk management is aimed primarily at actuaries, and offers a summary of the key themes and practices employed in risk management. A specific discussion of enterprise risk management (pages 26-32) defines ERM as 'the process of systematically and comprehensively identifying critical risks, quantifying their impacts, and implementing integrated risk management strategies to maximize enterprise value'. The paper includes a table that lays out the difference between traditional 'insurance-led' risk management and ERM, and concludes by asking how actuaries can add value to the ERM discussion.

"The Risk Manager of the Future: Scientist or Poet?" article is written by Eric Falkenstein, RMA Journal, February 2001. This very readable article offers a practical philosophy of enterprise-wide risk management for busy professionals and managers. The author concludes that the ideal risk manager of the future will need to understand risk analytics, possess keen skills in data integration and understand how risk measures relate to strategic and tactical business decisions. But such a risk manager will find it hard to keep their hands clean of 'dirty dealings' in institutional politics. The author is critical of "unfocused risk management" and says that "while RAROC applied everywhere is a good thing; it leaves a lot of ambiguity as to method, sort of like a manager telling his boxer to knock the other guy out". He reckons that in the future, 'quants' will be hired not on academic qualification but on their ability to explain complex risk measures to senior management.

3. Methodology and application of the proposed ANP Model

In this study ANP serves as the decision analysis tool and we implemented it using Super Decisions, a sophisticated and user friendly software that implements ANP (Saaty, 2001a). ANP makes it possible to deal systematically with the interactions and dependencies among the factors in a decision system (Bayazit and Carpak, 2007).

Criteria of the research were based on the results of literature search and analysis of guidelines published by various organizations about ERM framework. Firstly, in this section, I mention the ANP methodology and considered criteria of the effecting to decision making of ERM implementation. The importance of ERM implementation decision to organization explained that dividing into four main groups such as benefits, opportunities, costs and risks. The reason of this division is shaping according to the BOCR approach in the ANP. Detailed and holistic assessment is made by these criteria about demonstration to importance of ERM. The criteria are illustrated in fig.-2. These criteria are used in application of the proposed ANP model.

The study's problem is very complicated since it is include "importance of ERM and ERM implementation decision

to airline management". Also interrelations exist to between determined factors in this decision. They are included many qualitative measures. For these reasons ANP is selected as methodology of this study. ANP model is defined 4 steps in this study. They are;

(1) Definition of strategic criteria and determining of B, O, C R weighing

(2) Determining criteria to BOCR and performing pair-wise comparisons

(3) Determining alternatives and calculation of it's weighing

(4) Providing of final priorities

The ANP-based framework seems to be suitable to identify the relative importance of different factors on ERM implementation, since there is feedback and dependence among them. In this part of study, we describe the ANP decision model we used.

Step 1. Definition of strategic criteria and determining of B, O, C, R weighing (BOCR weight development): The strategic criteria I used to determine the priorities of the BOCR merits are shown in Fig.-1. These weights are obtained by using the Rating approach of AHP (Saaty, 2001). The strategic criteria are costs of setting and implementation of ERM, setting and implementation time to ERM, and effects on achieving to organizational objectives. These are the main criteria needed when a company makes a decision about implementing ERM. They are weighting as following rating:

Costs of setting and implementation of ERM: 0.107

Setting and implementation time to ERM: 0.109

Effects on achieving to organizational objectives: 0.782

The four merits of: benefits, opportunities, costs, and risks were rated according to five intensities (very high, high, medium, very low, low) listed below along with their priorities. The BOCR priority calculations are summarized in Table-1 are used in the main top-level structure to synthesize results.

Step 2. Determining criteria to BOCR and performing pair-wise comparisons (Model construction): The overall objective of this ANP model is to evaluate the ultimate relative importance of different factors that impact the implementation of ERM. The factors that will be used to evaluate the alternatives were developed earlier in the paper. Two alternatives, "ERM is important to airlines and airlines should apply ERM" and "ERM is not important to airline and airlines should not apply ERM" are determined and will be evaluated according to these factors. There are four feedback networks—one for each of four general controlling factors (the merits of the decision): benefits, opportunities, costs, and risks. First, the factors listed above that affect ERM implementation are classified into benefits, opportunities, costs, and risks. Then they are grouped into clusters in the networks under their respective merits. The clusters in the all merits network are: strategic, operational and financial benefits. There is an alternatives cluster in every network. A graphical summary of the overall ANP model is shown in Fig.-2.

Step 3. Determining alternatives and calculation of its weighing (Formulating the interdependencies and performing pair-wise comparisons between clusters/factors): I then formulated interrelationships among all the factors. The question asked when formulating these relationships was: With respect to a specific factor, which of a pair of factors influences it more? To establish the interdependencies in the networks, pairwise comparisons among all the factors are conducted and these relationships are evaluated. The next step is to weigh the clusters.

All cluster each in model (B, O, C and R) connected with alternatives cluster. So, any factors are not connected the other factors in other clusters. The cluster matrix for the benefits network is derived making pairwise comparisons of the clusters. For example, the cluster of financial effects the cluster of operational (0, 25);. The cluster of strategic affects the cluster of financial (0, 50). The cluster of alternatives is influenced by all the clusters.

Step 4. Providing of final priorities (Constructing supermatrix and obtaining the overall outcome): Table 2., 3. and 4. is illustrated of unweighted, weighted and limit supermatrix of the factors. Table 3 shows the pair-wise comparisons of the factors. The weighted supermatrix (Table-3) is obtained by weighting the blocks in the unweighted supermatrix by the corresponding priority from the cluster matrix. Table 4 shows limit matrix of model application results. The entries of the weighted supermatrix itself give the direct influence of any one factor on any other factor. The weighted supermatrix has some zeros indicating no interaction. Table 5 shows the stable and global priorities of all the factors. From it the priorities of all the factors and alternatives are extracted and normalized.

In the limit matrix, the columns are all the same. To determine the final local priorities the priorities of the factors for each cluster in the columns of the limit matrix are normalized to one.

As Saaty (2001b) suggested, I used additive synthesis to evaluate the alternatives in the final decision. In additive

synthesis, I have for example for Apply ERM benefits: 0.4196; opportunities: 0.2789; costs: 0.1716 and risks: 0.1298. Tables 6 and 7 give the necessary information to construct the overall synthesized results, which indicate ''ERM is important to airline management and airlines should apply ERM'' is chosen by the model, primarily with an overall priority of 0.767. Table-6. and 7 shows the final rating according to the global priorities and overall results of all the factors in the decision-making model. Table 7 shows that: Enterprise Risk Management is important for airline management, and ERM should be applying on airline business management.

4. Conclusion

The paper is presented a method for applying ANP in "determination of ERM importance and decision-making of ERM implementation at airline management" problem. In this paper, I have developed a framework based on ANP to identify the degree of impact of factors affecting ERM implementation decision. I used the ANP for decision making with dependence and feedback based on four major factors as mapped to Saaty's benefits, costs, opportunities, risk (BOCR) model. ANP is a new methodology that incorporates feedback and interdependent relationships among decision attributes and alternatives. It leads to fresh insights about issues.

Based on the model I found that in airlines, "importance of ERM and decision for implementing ERM" were 76.7% favorable as opposed to "ERM is not important and decision of not implementing ERM". This article is contributed to the field of ERM research in two important ways. Firstly, there is given the conflicting results on importance of ERM implementation as its benefits, opportunities, costs and risks. I am provided additional evidence of regarding this problem by case studies: ERM implementation samples from airlines. Second, this analysis is provides a better understanding of the source of potential value from ERM by airline. Also, ANP based approach is used in field of ERM. The study results are showed that ERM is very important for airline management. Therefore, Airline managers should apply to ERM in their management system. ERM implementation helps for airline managers to discover their own abilities, to become better at controlling their future and becoming more self-assured. If airline managers are unwilling to take risks, they will never realized their potential for self-fulfillment and self-realization.

This research contributes to both ERM knowledge and ANP implementation in this field. From ERM perspective I propose an ANP-based framework for assessing the impact of different factors on ERM implementation. Since ANP is capable of dealing with all kinds of feedback and dependence when modeling a complex decision environment, I contend that the study results are more accurate. ANP deals with uncertainty and complexity and provides insights that other, more traditional methods could miss.

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Table 1. Priority ratings for the merits: benefits, opportunities, costs and risks

	Priorities	Cost of Setting and Implementation of ERM 0.107880	Setting and Implementation Time to ERM 0.109803	Effects on achieving to organizational objectives 0.782317
Benefits	0.419635	very low	very low	very high
Opportunities	0.278885	low	low	high
Costs	0.171645	very high	very high	very low
Risks	0.129835	high	high	very low

Table 2. Unweighted super matrix

	Do not ~	Impleme~	Allocat~	Effecti~	Enhance~	Protect~	Save mo~	Shareho~	Enhance~	Enhance~	Reducin~	Common ~	Gaining~	Improve~	Increas~	intelli~	More ro~	Reasona~	Unpredi^
Do not ~	0.00000	0.00000	0.09999	0.09999	0.16667	0.12503	0.09999	0.09999	0.24998	0.50000	0.09999	0.00000	0.24998	0.12503	0.09999	0.09999	0.12503	0.09999	0.09999
Impleme~	0.00000	0.00000	0.90001	0.90001	0.83333	0.87497	0.90001	0.90001	0.75002	0.50000	0.90001	0.00000	0.75002	0.87497	0.90001	0.90001	0.87497	0.90001	0.90001
Allocat~	0.16667	0.03369	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Effecti~	0.16667	0.03791	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Enhance~	0.16667	0.16372	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Protect~	0.16667	0.37819	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Save mo~	0.16667	0.10262	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Shareho~	0.16667	0.28387	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Enhance~	0.33333	0.09152	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Enhance~	0.33333	0.17018	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Reducin~	0.33333	0.73831	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Common ~	0.12500	0.01895	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Gaining~	0.12500	0.04138	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Improve~	0.12500	0.02783	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Increas~	0.12500	0.18107	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
intelli~	0.12500	0.15133	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
More ro~	0.12500	0.02726	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Reasona~	0.12500	0.38811	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Unpredi~	0.12500	0.16408	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000

Table 3. Weighted super matrix

	Do not ~	Impleme~	Allocat~	Effecti~	Enhance~	Protect~	Save mo~	Shareho~	Enhance~	Enhance~	Reducin~	Common ~	Gaining~	Improve~	Increas~	intelli~	More ro~	Reasona~	Unpredi^
Do not ~	0.00000	0.00000	0.09999	0.09999	0.16667	0.12503	0.09999	0.09999	0.24998	0.50000	0.09999	0.00000	0.24998	0.12503	0.09999	0.09999	0.12503	0.09999	0.09999
Impleme~	0.00000	0.00000	0.90001	0.90001	0.83333	0.87497	0.90001	0.90001	0.75002	0.50000	0.90001	0.00000	0.75002	0.87497	0.90001	0.90001	0.87497	0.90001	0.90001
Allocat~	0.04167	0.00842	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Effecti~	0.04167	0.00948	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Enhance~	0.04167	0.04093	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Protect~	0.04167	0.09455	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Save mo~	0.04167	0.02566	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Shareho~	0.04167	0.07097	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Enhance~	0.08333	0.02288	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Enhance~	0.08333	0.04254	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Reducin~	0.08333	0.18458	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Common ~	0.06250	0.00948	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Gaining~	0.06250	0.02069	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Improve~	0.06250	0.01392	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Increas~	0.06250	0.09054	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
intelli~	0.06250	0.07566	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
More ro~	0.06250	0.01363	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Reasona~	0.06250	0.19405	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Unpredi~	0.06250	0.08204	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000

Table 4. Limit matrix

	is the ~	Benefits	Costs	Opportu~	Risks	Cost of~	Effects~	Setting~
is the ~	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Benefits	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Costs	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Opportu~	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Risks	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Cost of~	0.10789	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Effects~	0.78231	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Setting~	0.10981	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000

Table 5. Global priorities

Criteria	Priorities
Cost of Setting and Implementation of ERM	0.107887
Effects on achieving to organizational objectives	0.782307
Setting and Implementation Time to ERM	0.109806

Table 6. Final Ratings Table

Graphic	Ratings Alternatives	Total	Ideal	Normal	Ranking
	Benefits	0.8144	1.0000	0.4196	1
	Costs	0.3331	0.4090	0.1716	3
	Opportunities	0.5413	0.6646	0.2789	2
	Risks	0.2520	0.3094	0.1298	4

Table 7. Overall Results

Name	Graphic	Ideals	Normals	Raw
Do not Implementation of ERM		-0.302580	-0.232293	-0.193213
Implementation of ERM		1.000000	0.767707	0.638551

Strategic Criterias in Evaluating Merits

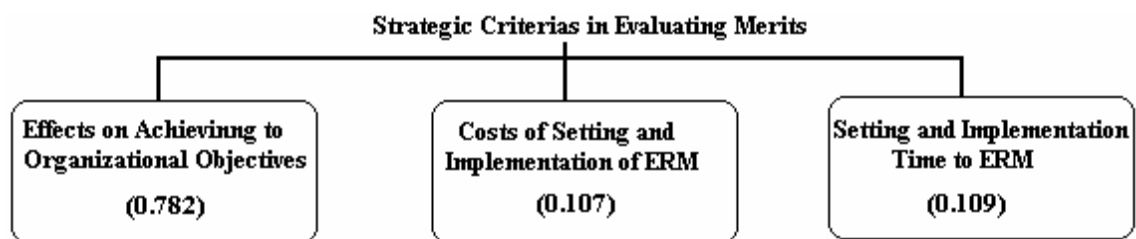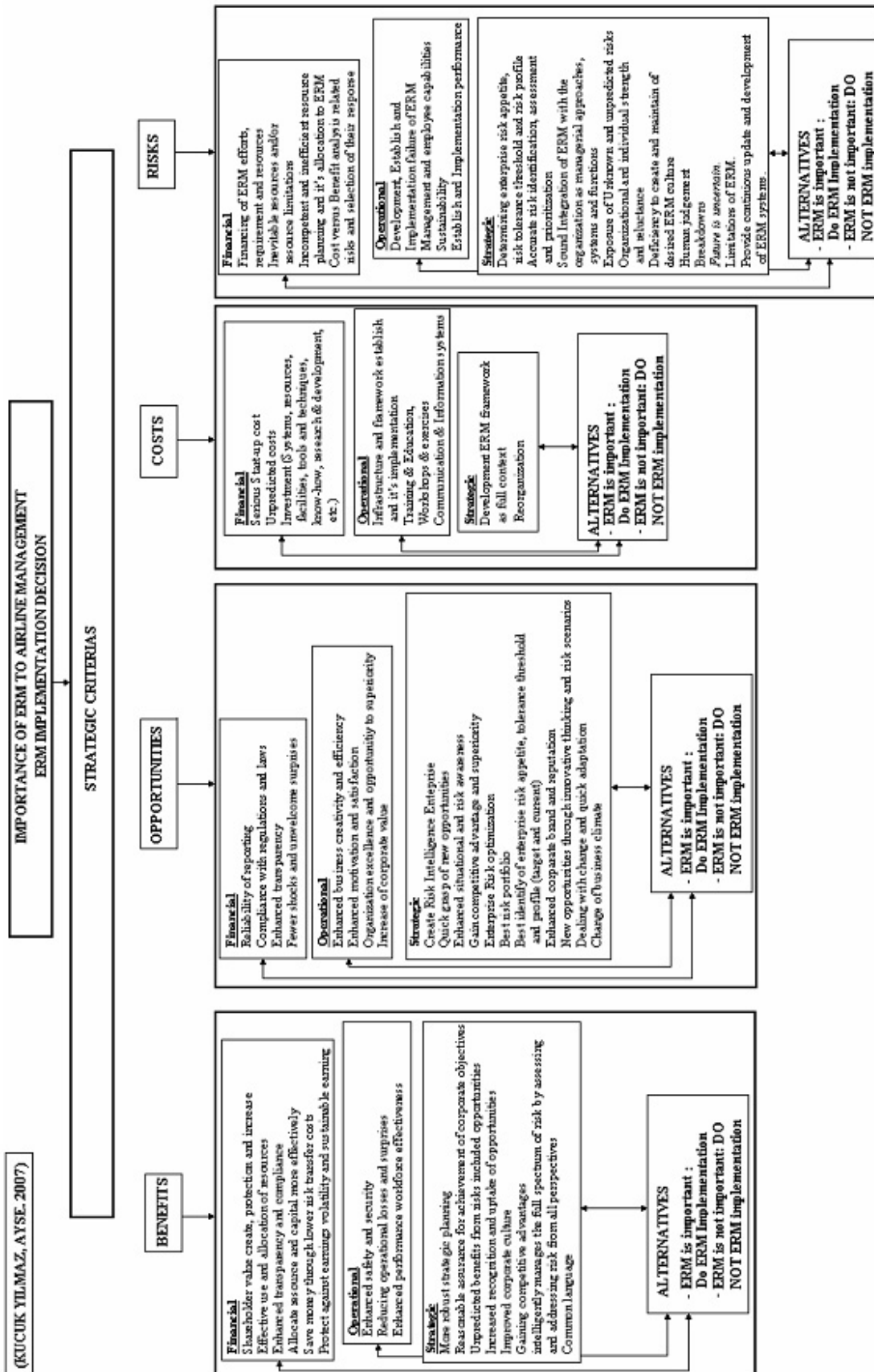| Effects on Achievinng to Organizational Objectives (0.782) | Costs of Setting and Implementation of ERM (0.107) | Setting and Implementation Time to ERM (0.109) |

Figure 1. BOCR merit criteria

Figure 2. Proposed ANP Model (Kucuk Yilmaz, 2007)