Development of a fuzzy ANP based SWOT analysis for the airline industry in Turkey

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ABSTRACT

Strengths, Weaknesses, Opportunities, and Threats (SWOT) analysis has been widely used to evaluate alternative strategies in order to determine the best one for given business setting. This study aims at providing a quantitative basis to analytically determine the ranking of the factors in SWOT analysis via a conventional multi-criteria decision making method, Analytic Network Process (ANP). The ANP method is preferred in this study because of its capability to model potential dependencies among the SWOT factors. The study presents uniqueness in the way it incorporates inherent vagueness and uncertainty of the human decision making process by means of the fuzzy logic. The proposed *SWOT fuzzy ANP* methodology was implemented and tested for the Turkish airline industry. The results showed that the *SWOT fuzzy ANP* is a viable and highly capable methodology that provides invaluable insights for strategic management decisions in the Turkish airline industry, and can also be used as an effective tool for other complex decision making processes.

1. Introduction

Turkey is strategically positioned astride three continents (Europe, Africa and Asia) sharing a border with nine different nations in the region. With a fast growing population, rapid urbanisation, booming tourism industry and an increasing regional commercial base, Turkey is witnessing a need to further develop its civil aviation and airport infrastructure in the near future. As a point of reference, Turkey is larger than any country in the Europe except Russia. Given its large size and growing population, the residents of Turkey have come to rely on domestic and international air service.

The roots of the Turkish airline industry could be traced back to 1933, when the Turkish Airlines (TA) was founded. Between 1933 and 1982, it was the sole player in the Turkish airline industry. In 1982, when the market was deregulated the competitors entered in the airline market and began to operate domestic and international flights. Shortly thereafter, due to fierce competition, many of those new comers into the market went bankrupt (of the 29 airlines established in 1982, 22 went bankrupt in a very short time) (http://www.byegm.gov.tr/, 2009). In 1983, the Turkish Civil Aviation Law was enacted that provided the private sector the right to operate an airline and an airport. A new era began through this legislation for the Turkish Civil Aviation whose activities rapidly grew.

In 1980s along with the fast growing tourism industry the air transportation industry in Turkey also showed a fast growing trend. Many charter airlines were founded and started to operate in the Europe–Turkey tourist charter markets. In the second half of the decade both Turkish Airlines and the private charter airlines enlarged their fleets. By the end of 2003, the Turkish government changed its air transportation policy and all restrictions on private airline companies to operate in scheduled domestic routes were lifted, and the domestic routes were opened into the competition. Furthermore, in order to further incentivise companies, the tax reduction was provided for the domestic flights. This was the re-deregulation of the Turkish Air Transportation Industry that gave the private airlines an opportunity to enter the domestic market where they rapidly grew. Taking advantage of the opportunity, the airline carriers offered 30–35% lower prices compared to their largest competitor, Turkish Airlines. This led to a huge demand for air transportation and the growth of the market (Sengur & Sarilgan, 2005). As of now, there are 14 private airline companies in Turkey whose fleets comprise 100s of aircrafts. The number of seats in private airline companies is in excess of 21,000 (Atalık & Arslan, 2009).

This paper is divided into seven parts, including introduction. The second part (called literature review) reviews published literature to succinctly describe Strengths, Weaknesses, Opportunities and Threats (SWOT) method, to reveal its major drawbacks, and offer a multi-methodology approach to overcome those drawbacks. The third part (called background information) briefly describes

Analytic Hierarchy Process (AHP), Analytic Network Process (ANP), fuzzy AHP, and fuzzy ANP. The fourth part (called proposed SWOT fuzzy ANP methodology) explains the proposed multi-methodological approach in a step-by-step fashion. The fifth part (called the application of SWOT fuzzy ANP methodology in the Turkish domestic airline industry) employs the proposed multi-methodology approach to analyse the Turkish Airlines industry so as to provide decision aid to airline companies in developing their strategies for their domestic operations. The sixth part (called comparing AHP, ANP, FAHP, and FANP results) compares and contrasts outcomes of these approaches. The seventh (and the last) part (called conclusion) summarises the study, restates the empirical findings and provide future research directions.

2. Literature review

SWOT analysis was popularised by Andrews (1965) who combined the ideas of Peter Drucker, Philip Selznick and Alfred Chandler. Drucker (1946) searched for the source of the company's success. He found out that successful organisations should have external purposes and objectives that were directed to determining customer needs and satisfying them. Selznick (1957), on the other hand, proposed two terms "distinctive competences" and "environmental uncertainty". The former dealt with unique capabilities and values possessed by particular organisations that put emphasis on giving them a "sustained competitive advantage". The latter pointed out that in early times firms did not necessarily respond rationally to their environments, but rather they internalised cultural norms and values of the wider system or society in which they operate. Chandler (1962) analysed four multinational companies' growth processes and their injection into their managerial structures. He implied the significance of strategic thought and comprehension in organisations. Chandler argued that environmental variables such as aggregate demand, supply resources, economic fluctuations, technological developments and competitors' behaviour will affect an organisation's strategy that includes determination of objectives, environmental domain, market, and allocation of resources and vice versa. An organisation should be aware of developmental opportunities as a consequence of environmental changes and be capable of responding them creatively. In light of these views, Andrews formulated SWOT analysis which proposed that a firm could generate its strategy after cautiously evaluating the components of its internal and external environments. This allowed companies to use long range planning approach based on

qualitative analysis rather than quantitative forecast (Barca, 2005; Learned, Christensen, Andrews, & Guth, 1965).

SWOT matrix, in theory, presents a mechanism for facilitating the linkage among company strengths and weaknesses (internal factors), and threats and opportunities (external factors) in the marketplace. It also provides a framework for identifying and formulating strategies. Matching key internal and external factors is the hardest and challenging part of generating a SWOT matrix and requires the discretion of the practitioner. SWOT matrix helps managers develop four types of strategies respectively as illustrated in Fig. 1, namely SO (strengths-opportunities) strategies, WO (weaknesses-opportunities) strategies, ST (strengths-threats) strategies, and WT (weaknesses-threats) strategies. *SO strategies* use a firm's internal strengths to take advantage of external opportunities. *WO strategies* improve internal weaknesses by taking advantage of external opportunities. *ST strategies* use a firm's strengths to avoid or reduce the impact of external threats. *WT strategies* are defensive tactics directed at reducing internal weaknesses and avoiding environmental threats (Weihrich, 1982). There are eight steps involved in constructing a SWOT matrix: (1) list the firm's key external opportunities, (2) list the firm's key external threats, (3) list the firm's key internal strengths, (4) list the firm's key internal weaknesses, (5) match internal strengths with external opportunities and record the resultant SO strategies, (6) match internal weaknesses with external opportunities and record the resultant WO strategies, (7) match internal strengths with external threats and record the resultant ST strategies, and (8) match internal weaknesses with external threats and record the resultant WT strategies (David, 2007).

Due to its abovementioned capabilities in strategic management, SWOT analysis has been widely utilised in various business settings to make effective decisions. However, it possesses a major drawback: the lack of the identification of the importance ranking for the SWOT factors/criteria. Therefore, researchers developed models which incorporate Analytic Hierarchy Process (AHP) in SWOT and named their approaches "SWOT-AHP method (or analysis)" which can determine the priorities for the SWOT factors (Kahraman, Demirel, & Demirel, 2007; Kurttila, Pesonen, Kangas, & Kajanus, 2000; Shrestha, Alavalapati, & Kalmbacher, 2004). Moreover, Yuksel and Dagdeviren have recently developed a more sophisticated model with Analytic Network Process to capture *potential interactions, interdependences*, and *feedbacks* amongst the SWOT matrix factors (Yuksel & Dagdeviren, 2007). Although these approaches have brought new insights into the scene and deserve merit in terms of analytical foundation to determine the

	STRENGTHS-S	WEAKNESSES-W
	1. 2. . List of Strengths . . n	1. 2. . List of Weaknesses . . n
OPPORTUNITIES-O 1. 2. . List of Opportunities . . n	SO STRATEGIES 1. 2. . Use strengths to take advantage of . opportunities . n	WO STRATEGIES 1. 2. . Overcome weaknesses by taking . advantage of opportunities . n
THREATS-T 1. 2. . List of Threats . . n	ST STRATEGIES 1. 2. . Use strengths to avoid threats . . n	WT STRATEGIES 1. 2. . Minimize weaknesses . to avoid threats . n

Fig. 1. A generic presentation of the SWOT matrix.