Mining the Generation Xers' job attitudes by artificial neural network and decision tree—empirical evidence in Taiwan

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Abstract

This paper employs artificial neural network and decision tree to derive knowledge about the job attitudes of Generation Xers. The sample frame consisted of 1000 large Manufacturing Industries and 500 large Service Industries, randomly selected from the Common Wealth Magazine 1000 index of Taiwan Manufacturing Industries and Service Firms. Then, we exploited the ART2 neural model to take the collected data as inputs and form performance classes according to their similarities. Finally, the decision tree was employed to determine definitions for each class, resulting in 52 rules associated with certainty factors. The results could be used to develop an intelligent decision support system for the recruitment and management of Generation Xers.
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1. Introduction

'Generation Xers' is a fashionable term in today's society. The last decade of literature reports many differences between the two most prevalent workforce groups (Baby-Boomers and Generation Xers) with different work values and job attitudes that can lead to conflict (Adams, 2000; Bradford, 1993; Jurkiewicz, 2000; Karp, Sirias, & Arnold, 1999; Kupperschmidt, 2000; O'Bannon, 2001). Kupperschmidt (2000) suggested that understanding these differences may help managers increase employee's productivity. With global competition, it is critical for organizations to be able to integrate and employ intelligence knowledge to innovate and survive under the new complex business environment. If the hidden knowledge can be made explicit, it can be used to improve vital business processes. Data-mining (DM) is one of the important techniques of information technology and known to be effective in dealing with the discovery of hidden knowledge, unexpected

patterns and new rules from databases (Adriaans & Zantinge, 1998; Han & Fu, 1999). Data-mining has been extensively used in a multitude of applications within various industries, in particular the enhancement of organizational decision-making. In the past few years, data-mining has also demonstrated enormous benefit to business (Feelders, Daniels, & Holsheimer, 2000). Although DM now omnipresent in production (Milne, Drummond, & Renoux, 1998; Symeonidis, Kehagias, & Mitkas, 2003), marketing (Brachman, Khabaza, Kloesgen, Piatetsky-Shapiro, & Simoudis, 1996; Changchien, Lee, & Hsu, 2004; Chun & Kim, 2004) and finance (Deboek & Kohonen, 1998; Liao & Chen, 2004), yet few of these studies utilize it as a methodology capable of providing solutions to personnel research. Traditionally, regression analysis has been the common tool used in work attitudes studies, but in recent years expert systems and artificial neural networks (ANNs) have become successful alternatives regarding personnel research (Collions & Clark, 1993; Somers, 2001).

Nonetheless, expert systems have limitations. They may include incorrect knowledge, difficulty in obtaining knowledge from the appropriate experts, difficulty in representing knowledge in a computer model, and lack of learning capability (Chu, 1990). A few recent studies in organizational psychology using ANNs achieve better predictive

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accuracy than conventional statistics (Carson et al., 1999; Collions & Clark, 1993). Therefore, recent developments are responsible for their new popularity (Simon, 1992). Although their universal approximation property seems attractive at first sight, their intrinsically black-box nature has prevented them from being successfully applied in a management science field. Decision tree techniques build classification or regression models by recursive partitioning of data. Decision trees are easy to interpret, computationally inexpensive, and capable of dealing with noisy data (Li, Sweigart, Teng, Donohue, & Thombs, 2001). Decision trees have been used in business data-mining packages and can easily interpret business databases. The majority of decision trees deal with classification problem, which is also the primary concern in this study.

In recent years, as expertise in artificial intelligence has gradually matured, the application of artificial intelligence has spread broadly as well. Its applications focus on computerizing human intelligence to enable computers to employ independent thinking, learning, and problem solving. This paper employs neural network learning techniques and decision tree method to obtain knowledge of the job attitudes of Generation Xers. This is not only more identical, but can also make-up for insufficient experts. Consequently, our research differs from those done earlier. First, in this study, we combined artificial intelligence and human resource management field to exploit the factors affecting Generation Xers' job attitudes (including both linear and non-linear relations). Second, we try to break-through the constraints and limits of the traditional statistical technique by using the validity of the forecasting results of the induced knowledge to replace the statistical significance of the variables. Third, this structure can still be used even if the relationship between these factors is changing with time due to the self-learning capability of this system. Hence, this system would help selecting and managing Generation Xers employees efficiently and effectively.

2. Literature review

2.1. Overview of generation Xers

Generation Xers (hereinafter 'Xers') were born approximately after 1965, in contrast to Baby-Boomers (hereinafter 'Boomers'), who were born approximately between 1946 and 1964. Different terms are employed to define this generation in various studies. Coupland (1991) uses 'Generation X', 'Twenty somethings' to indicate people who were born between 1966 and 1976. Burke (1994) names people born during 1946–1964 as 'Baby busters' or 'Slackers'. Most research identifies Xers as people born after World War II, and before the 1980s. Xers grew up with financial and societal insecurity; rapid change; great diversity, and a lack of solid traditions. This led to a sense

of individualism over collectivism (Jurkiewicz & Brown, 1998). They bring to the workplace well-honed, practical approaches to problem solving. They are technically competent, and very comfortable with diversity, change, multi-tasking, and competition (Kupperschmidt, 2000). Many definitions given by much previous research emphasized the time period in which the Xers were born, instead of taking social meaning into account. However, there is no precise, academic definition of the new generation, in Taiwan. The economic structure changed with the era, along with the concomitant social evolution of Taiwan. In particular, 1965, signaled this key era of change. That year, industrial net production of industries surpassed that of agriculture. It was regarded as the 'wealthy' experience. People broadly label those between 30 and 40 years of age, as the 'New Generation'. Lan (1996) pointed out that the New Generation (1965–1975) and Old Generation (born before 1971) has obvious different work values and job attitudes. Hsiau (1995) also pointed out that the population under 30 years old (born after 1965) have enjoyed rich material lives since they were children. According to the above literature, we can conclude that the New Generation has different definitions, and differs in various situations and countries. After synthesizing the above-mentioned literature, this research mainly adopts Hsiau's point of view (1995). Consequently, our study defines the people who were born between 1965 and 1975 and who are currently employed, as Xers, incorporating the broad and narrow views of the meaning.

It is known that the gap between boomers and Xers is wider than ever before. The Xers encounter a more rapidly changing living environment than do their 'baby-boomer' counterparts, with diversified values and life philosophy. Members of this generation often are derided with such stereotypes as hedonists, individualists or liberalists, and for having inconsistent value systems. Jennings (1999) noted that skills, knowledge, critical thinking, work, and morality are the five most pronounced areas. Since the 1980s, Xers have continually entered the workplace with a new work ethic and sense of self worth. However, since each group has its own unique set of circumstances, they both bring different histories to the workplace. Boomers are remarkable for their hard work, ethics, high loyalty, and commitment. Xers are quite different from their boomer predecessors. Losyk (1997) suggested that Xers are ambitious, determined, independent, confident, and have much to offer. Thus, knowledge concerning the effective management of the Xers workforce has been a worthy area for further research.

2.2. Job attitudes

In the past decades, many articles have been devoted to the study of work attitudes in the workplace. Attention, especially to job involvement, job satisfaction and organizational commitment cannot be overemphasized. These job