

## Prioritization of human capital measurement indicators using fuzzy AHP

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### Abstract

People in an organization constitute an important and essential asset which tremendously contributes to development and growth of that company by the help of their collective attitudes, skills and abilities. This is why the human capital (HC) can be considered the most important sub-dimension of the intellectual capital. Since you cannot manage what you cannot control, and you cannot control what you do not measure, the measurement of HC is a very important issue. This study aims at defining a methodology to improve the quality of prioritization of HC measurement indicators under fuzziness. To do so, a methodology based on the extent fuzzy analytic hierarchy process (AHP) is proposed. Within the model, five main attributes; talent, strategical integration, cultural relevance, knowledge management, and leadership; their sub-attributes, and 20 indicators are defined. The proposed model can be used for any country. However, the results obtained in the numerical example reflect the situation of HC in Turkey, since the experts are asked to make their evaluations considering the cultural characteristics of Turkey. The results of the study indicate that “creating results by using knowledge”, “employees’ skills index”, “sharing and reporting knowledge”, and “succession rate of training programs” are the four most important measurement indicators for the HC in Turkey.

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### 1. Introduction

Many of the differences often exist between the market and book values of companies can be explained by intellectual capital (IC) assets not recognized in company balance-sheets (Brennan & Connell, 2000). IC can be thought of as the knowledge-based equity of a company (International Federation of Accountants, 1998). It is the pursuit of effective use of knowledge (the finished product) as opposed to information (the raw material) (Bontis, 1998) and includes assets relating to employee knowledge and expertise, customer confidence in the company and its products, brands, franchises, information systems, administrative procedures, patents, trademarks and the efficiency of company business

processes (Danish Trade and Industry Development Council, 1997).

Intangible assets used to be defined very narrowly, not including assets such as human resources, customer loyalty, company reputation. However, these elements of intellectual capital, if managed properly, have huge potential for creating value which many companies feel can no longer be ignored (Brennan & Connell, 2000). Today, IC is widely recognized as the critical source of true and sustainable competitive advantage (Marr, Schiuma, & Neely, 2002). Carlucci, Marr, and Schiuma (2004) shows that the management of IC directly impacts business performance. Knowledge is the basis of IC and is therefore at the heart of organizational capabilities. The need to continuously generate and grow this knowledge base has never been greater (Marr, 2004). Successfully utilizing that knowledge contributes to the progress of society (Seetharaman, Low, & Saravanan, 2004).

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Bozbura and Beskese (2005) prefers a three-part definition of intellectual capital that includes human, relational, and organizational components (see Fig. 1).

In this figure:

1. The Human Capital (HC) is the individual-level knowledge that each employee possesses (Bontis, Keow, & Richardson, 2000).
2. Organizational Capital is the sum of all assets that make the creative ability of the organization possible (Bozbura, 2004).
3. The Relational Capital is the sum of all assets that arrange and manage the firms' relations with the environment. The relational capital contains the relations with customers, shareholders, suppliers, rivals, the state, governmental institutions and society (Bozbura, 2004).

The HC is the most important asset of the intellectual capital, since it is the source of creativity in the organization. Implicit knowledge assets of the employees in the organization constitute one of the most crucial elements that affect the work performance of the company. However, only the existence of implicit knowledge is not enough for the performance of the organization. The aim is to make the implicit knowledge of the employees an explicit knowledge in every organizational level. In this way, it will be possible to create an organizational value.

The human in a company enhances the operational activity of tangible assets (tools and equipments) and activates intangible assets (Fitz-enz, 2001). Increasing the employees' capabilities has a direct impact on the financial results of the company (Becker, Huselid, & Ulrich, 2001).

The selection of IC measurement indicators is a multi-criteria decision problem that requires resolutions involved with various stakeholders' interests. There has been no basis model for IC statements, nor bottom-line indicators of the value of IC (Han & Han, 2004). In order to assist management decision-making in selecting IC indicators for measurement and disclosure, Han and Han (2004) suggest a model that identifies the criteria reflecting decision usefulness and expected risk factors. They proposed an

AHP based decision model based on the analysis of the conceptual framework of the qualitative characteristics of financial information and an examination of information quality of the information system.

In real word applications, precise data concerning measurement indicators of HC are not available or very hard to be extracted. In addition, decision-makers prefer natural language expressions rather than sharp numerical values in assessing HC parameters. So, HC is an inherently fuzzy notion, which can be measured by the synthesis of its constituents. Fuzzy logic offers a systematic base in dealing with situations, which are ambiguous or not well defined (Kahraman, Beskese, & Ruan, 2004). Indeed, the uncertainty in expressions such as "low talent", "moderate ability of knowledge creation" or "high experience", which are frequently encountered in the HC literature, is fuzziness.

In the literature, there is no fuzzy logic method aimed at prioritizing any part of intellectual capital measurement indicators. As a value-added to the literature on the topic, this paper aims at providing practitioners with a fuzzy point of view to the traditional HC analysis methods for dealing quantitatively with imprecision or uncertainty and at obtaining a fuzzy prioritization of HC measurement indicators from this point of view that will close this gap considerably.

The paper is organized as follows: Section 2 presents some general knowledge about multi-attribute decision-making techniques used for prioritization. Section 3 includes a summary of the basics of fuzzy sets and numbers. Section 4 overviews fuzzy AHP literature, and defines the steps of the selected fuzzy AHP method (i.e., Chang's extent analysis, Chang, 1992, 1996) to be used in the proposed model. Section 5 proposes a hierarchical model for the prioritization of HC measurement indicators. Section 6 includes a real-life numerical application in Turkey. Finally, Section 7 presents the conclusion.

**2. Multi-attribute decision-making techniques used for prioritization**

Multi-attribute decision-making (MADM) techniques have the advantage that they can assess a variety of options

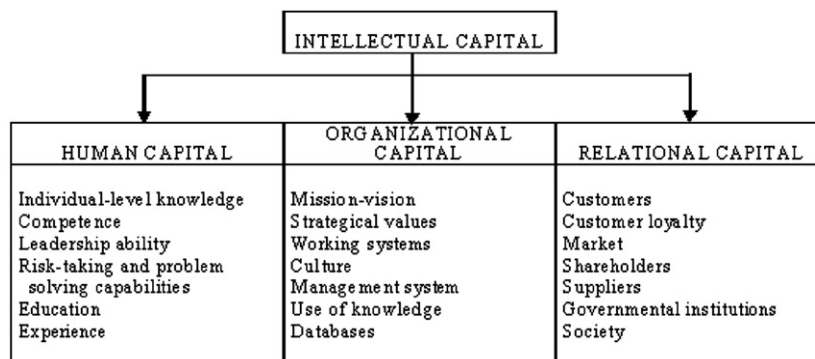


Fig. 1. Components of Intellectual Capital.

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