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Intelligent decision system and its application in business innovation self assessment

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Abstract

In this paper, it is described how a multiple criteria decision analysis software tool, the Intelligent Decision System (IDS), can be used to help business self-assessment. Following a brief outline of a model for assessing business innovation capability and the IDS software, the process of using IDS to implement different types of assessment questions is discussed. It is demonstrated that IDS is a flexible tool capable of handling different types of data in self-assessment, including uncertain and incomplete data, and providing a wide range of information including scores, performance diversity, strength and weakness profile and graphics.

Keywords: Multiple attribute decision making; Evidential reasoning approach; Intelligent decision system; Decision support system; Self assessment; Knowledge management

1. Introduction

Many small and medium sized enterprises (SMEs) in the UK and Europe strive for business excellence through innovation. Entering Tailored Innovation Management in Very Small Enterprises (ENTERTAIN) is a European Commission funded project under the Innovation and SME Programme. The main objective of the project is to help SMEs to improve their innovation strength through self-assessment, self-training and remotely assisted consultancy.

In order to achieve the first goal, an innovation capability Self-Assessment model (SA model) was developed by the project consortium, taking into account the specific needs and characteristics of SMEs. The SA model covers 7 areas of a business. Under each area, 7–14 questions are asked about the business. Some questions are divided into a few sub-questions. Therefore the self-assessment model is in a hierarchical structure (Fig. 1).

The SA model and indeed many other self-assessment models such as EFQM (European Foundation of Quality Management) model [3] are typical Multiple Criteria Decision Making (MCDM) problems [22,1]. Assessment models, however, also have the following two features. The first feature is that they

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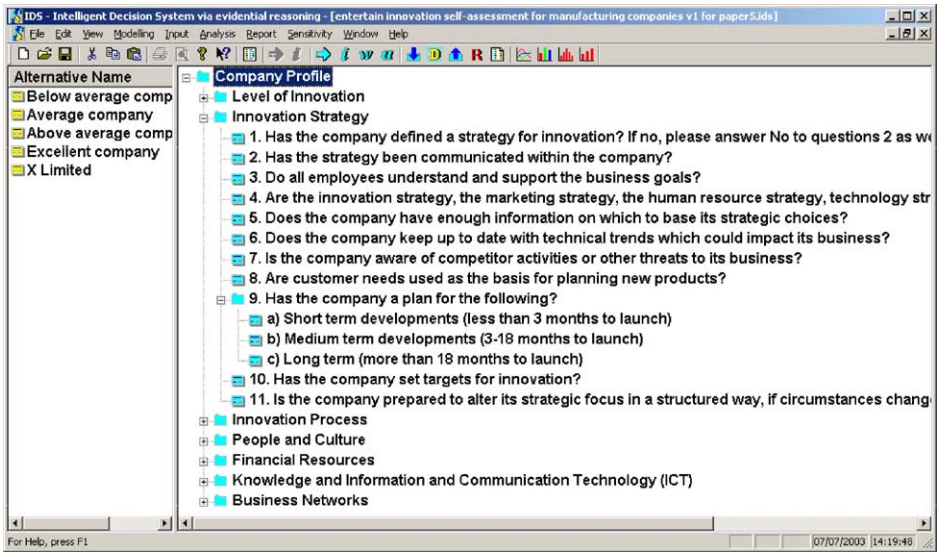

Fig. 1. IDS main window and the SA model hierarchy.

are normally pre-structured. The same fixed models will be used by many different organisations to ensure that assessments are based on the same standards. The other feature is that they normally consist of tens, sometimes hundreds, of questions. The EFQM model lists 172 areas for a business to consider when using the model for self-assessment and for award applications.

The Intelligent Decision System[1] (IDS for short) is a general-purpose multicriteria decision analysis tool based on a new methodology called the Evidential Reasoning (ER) approach [20]. During the past few years, the authors and their colleagues have applied IDS to support business performance assessment and organisational self-assessment using different models [7–9,22,13]. The results show that the ER approach, supported by IDS, has significant advantages over conventional methods in helping to improve consistency, transparency and objectivity in the assessments.

As such, one of the tasks of the ENTERTAIN project is to implement the SA model using IDS in order to help SMEs to conduct the self-assessment more efficiently, objectively and informatively.

Like many other business performance assessment models, the SA model is also pre-structured. The questions, answers and scoring scheme in the SA model are designed mainly based on experiences, other similar models and consultation with business advisors and small business owners. Although the IDS software can also provide support in problem structuring, weight and value elicitation, and sensitivity analysis, such support is not required in this case. Therefore the main focus of this paper is on how the SA model is implemented, how the self-assessment process is supported by IDS, and the advantages of IDS over other tools.

In the following section, the SA model will be outlined and the ER approach and the IDS software briefly described. The process of implementing the SA model using IDS will be demonstrated using examples. The features, advantages and benefits of using IDS for self-assessment will be demonstrated by the self-assessment data of a few fictitious companies. Although the package was used to assess real businesses, due to confidentiality restriction we are unable to use the real data in this paper.

2. The SA model

Most SMEs are of limited resources for self-assessment. Therefore the SA model has to be simple, easy to understand, not too long or tedious, general enough

[1] A free learning version of IDS is available from the site www.e-ids.co.uk.