Fuzzy Decision Support in the Early Phases of the Fuzzy Front End of Innovation in Product Development

The innovation process may be divided into three areas: the fuzzy front end (FFE), the new product development (NPD) process, and commercialization. Every NPD process has a FFE in which products and projects are defined. Companies tend to begin the stages of FFE without a clear definition and analysis of the process to go from opportunity identification to concepts, and often they even abort the process or start over. Koen’s Model for the FFE is composed of 5 different phases, the first two being Opportunity Identification and Opportunity Analysis, which are the focus of this paper. Furthermore, several tools can be used by designers/managers in order to improve, structure and organize their work during the FFE. However, these tools tend to be selected and used in a heuristic manner. Additionally, some tools are preferred and more effective during specific phases of the FFE; hence an economic evaluation of the cost of their usage is very critical and there is also a need to characterize them in terms of their influence on the FFE. This paper focuses on decision support for managers/designers in their process of assessing the cost of choosing/using tools in the core front end activities, namely Opportunity Identification and Opportunity Analysis. This is achieved by analyzing the Influencing Factors (Firm context, Industry context, Macro environment) along with data collection from managers followed by the automatic construction of fuzzy decision support models (FDSM) of the discovered relationships. The decision support focuses upon the estimate investment needed for the use of tools during the 2 phases cited above. The generation of FDSMs is carried out automatically using a specialized genetic algorithm applied to learning data obtained from 5 experienced managers from 5 different companies. The automatically constructed FDSMs accurately reproduced the managers’ estimations using the learning data sets and were very robust when validated with hidden data sets.