Fuzzy Decision Support for Tools Selection in the Core Front End Activities of New Product Development - DTU Orbit (22/12/2018)

Fuzzy Decision Support for Tools Selection in the Core Front End Activities of New Product Development

The innovation process may be divided into three main parts: the front end (FE), the new product development (NPD) process, and the commercialization. Every NPD process has a FE in which products and projects are defined. However, companies tend to begin the stages of FE without a clear definition or analysis of the process to go from Opportunity Identification to Concept Generation; as a result, the FE process is often aborted or forced to be restarted. Koen’s Model for the FE is composed of five phases. In each of the phases, several tools can be used by designers/managers in order to improve, structure, and organize their work. However, these tools tend to be selected and used in a heuristic manner. Additionally, some tools are more effective during certain phases of the FE than others. Using tools in the FE has a cost to the company, in terms of time, space needed, people involved, etc. Hence, an economic evaluation of the cost of tool usage is critical, and there is furthermore a need to characterize them in terms of their influence on the FE. 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 (CFE) activities identified by Koen, namely Opportunity Identification and Opportunity Analysis. This is achieved by first analyzing the influencing factors (firm context, industry context, macroenvironment) 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 estimated investment needed for the use of tools during the CFE. The generation of FDSMs is carried out automatically using a specialized genetic algorithm, applied to learning data obtained from five experienced managers, working for five 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. The developed models can be easily used for quick financial assessments of tools by the person responsible for the early stage of product development within a design team. The type of assessment proposed in this paper would better suit product development teams in companies that are cost-focused and where the trade-offs between what (material), who (staff), and how long (time) to involve in CFE activities can vary a lot and hence largely influence their financial performances later on in the NPD process.