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Identimod: Modeling and managing brand value using soft computing

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ABSTRACT

Brands are one of the most important of a firm's assets. Brand-managing activities are typically related to brand positioning and integration with marketing campaigns, and can involve complex decisions. The branding of an organization is indeed a dynamic system with many cause-effect relationships as well as intangible and heterogeneous variables. In order to help brand managers and marketers, we propose a decision support system, named Identimod, for modeling and evaluating branding strategies. Identimod uses non-linear dynamic modeling and soft computing to identify the branding system from different data sources through a linguistic user interface, and to provide advanced methods for diagnostics and validation. Identimod steps through a participatory, cyclic, and iterative process consisting of four different modules to increase the confidence and validity of the model, which should facilitate its acceptance by managers and stakeholders. Throughout this paper we demonstrate the modeling process and managerial benefits of Identimod by forming and answering the marketing questions for a real rebranding case of a seafood company in Spain.

1. Introduction

For companies, branding is a top management priority as brands are one of the most valuable intangible assets that firms have [1, 2, 23, 25]. The decisions made by marketers, especially frequent ones, must be aligned with the brand management of the company, which involve tasks such as developing brand positioning, integrating marketing activities, assessing brand performance, and strategically growing the brand [25]. The brand image management of an organization is a process that regularly includes group decision making, managers' experience, intuition, and judgment, and so is complex because it generates a high level of uncertainty and ambiguity [31].

Managing brands requires studying and anticipating the effects of complex dynamic interactions between a company, the business environments, and all the stakeholders. Managerial decisions usually involve intangible variables related to the brand, called brand intangibles, which are aspects of a product/service that do not involve physical or concrete attributes/benefits and play an important role for building the brand image and reputation of a firm [25, 26]. Marketers also need to integrate strategies built on intangible brand variables with marketing activities, which affect the brand positioning and equity of the company [25].

The main goal of the presented work is to propose a decision support system (DSS) to help marketers and stakeholders when modeling branding systems that have intangible variables. This work contributes to existing literature by defining the architecture and implementing a DSS with a new way of dealing with intangible branding variables and their relationships. The proposed DSS is able to handle branding variables and their complex relationships with linguistic interfaces, and is designed to facilitate the iterative nature of the modeling process. It also highlights the need for a complete model validation process and provides the DSS user with tools to do it [43]. Another important feature of the DSS is the use of a participatory modeling process to involve stakeholders and promote better marketing decisions [51], meaning that both modelers and decision makers contribute to the modeling process. The stakeholders' participation is a key requirement for appropriate model development and promotes the final adoption of the model's results.

Identimod is the name of our proposed DSS, whose methodology is based on Vester's sensitivity model (VSM) [49, 50], a semi-quantitative modeling tool using system dynamics [17] and fuzzy logic [52]. This methodology has already been applied to different problems [22, 44]. Broadly speaking, system dynamics is a modeling

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tool appropriate for brand value management [2] because brands can be considered a dynamic system where all their components are treated as resources which grow or erode over time [36]. Beyond the VSM approach, we also incorporate soft computing [9] techniques into Identimod to better cope with the branding complexity. The branding complexity occurs when dealing with many managerial problems, in part caused by the presence of a heterogeneous group of stakeholders who need to make decisions [31, 51]. This participatory modeling needs methods able to deal with human feelings, perceptions, and their corresponding uncertainty [51]. Extending VSM with soft computing techniques in Identimod allows managers to easily model the uncertainty present in branding and marketing systems by defining linguistic variables, effects, and simulation cases with a human-centric interface [20].

The proposed DSS aims to promote the discussion and improvement of the branding models by identifying their structure, validating the model with respect to the brand in reality, and run what-if scenarios to test marketing actions. Identimod relies on an iterative and cyclic modeling process, and its DSS architecture is divided into four modules: (i) a generation module, where modelers identify the variables of the branding system and their relationships with respect to the stated goals with the collaboration of stakeholders; (ii) a diagnostics module, where modelers make use of diagnostics tools to ease the analysis of the branding model structure; (iii) a validation module, to check the validity of the model using a set of tools such as automatic model calibration with respect to the historical brand evolution; and (iv) a utilization module, to forecast the values of the branding variables to evaluate the most convenient marketing policies for different scenarios.

Previous studies already pointed out the successful use of soft computing and DSSs for strategic marketing [30, 31]. The use of soft computing, specifically fuzzy logic and computing with words [53], has important advantages when dealing with human perceptions and uncertainty. Fuzzy logic enables the use of natural language structures by computing with words to convey decision making. In essence, computing with words is a methodology for reasoning, computing, and decision-making with information described in natural language. The use of linguistic information in decision making demands computing processes using words to solve the related decision problems. A wide group of DSSs based on computing with words is reviewed in [32]. Identimod includes another soft computing technique, evolutionary algorithms [7], that have the ability to search for optimal solutions to complex problems and in a reasonable amount of time [7, 19].

In this paper, we initially present the background motivation for our work (Section 2). Later, Section 3 describes the architecture of the DSS, and Section 4 details the modules, processes, and stages in detail. Finally, we apply the Identimod framework and its four modules for a brand management case study of a real Spanish seafood company. This company produces and sells fish and seafood products (e.g., elver and surimi). Managers of the company wanted to prepare the brand for the upcoming launch of more products and a diversification of its product portfolio. Section 5 explains how Identimod can be used to model and answer the latter marketing questions for this real branding problem, from the use of data and expert knowledge for building validated models, to the simulation of three different scenarios. A final discussion about the managerial impact of Identimod and future areas for improvement is given in Section 6.

2. Background

There are different modeling methodologies for building complex business problems with the involvement of stakeholders [51]. These methodologies use non-linear dynamic models to characterize real-world, complex systems and the relationships of their elements. They are also particularly suited to building systems with a high number of interrelated variables and with scarce and/or uncertain data [38]. An important feature of the stated methodologies is they provide simulation tools to compare alternative business strategies and better assist decision makers with their managerial decisions [51].

A prominent example among the set of existing methodologies is system dynamics, which presents a theoretical framework with tools and techniques for developing mathematical models of complex systems for social, biological, and economic scenarios [17, 45]. System dynamics is intended to solve more strategic-level problems rather than other methodologies such as discrete-event simulations [47]. It is a methodology aimed at studying the structures of social or organizational systems by representing the causal relationships among their elements and the evolution of a system over time. System dynamics promotes the ongoing dialog among modelers and managers regarding strategy formation and its evaluation, and have been successfully applied to a diverse set of applications [4, 14, 41]. Among this diverse set of applications, few are used for branding. Crescitelli and Figueiredo [13] analyzed the brand equity evolution using system dynamics, and Chan and Ip [11] constructed a model for predicting the customer equity value for new product development. Gani and Groessler [18] conceptualized the linkage between brand equity and customer equity in a system dynamics model to provide insights on how these two concepts interact with each other. Finally, Mukherjee and Roy [36] developed a model for managing the brand equity and reputation of an Indian television show.

Brand value management can be seen as a complex, adaptive, and dynamic environment. The environment is usually a system with a high number of variables and contains non-linearities, inertia, delays, and bi-directional network feedback loops. System dynamics is an ideal methodology for such complex feedback systems, like brand management [36]. As pointed out by Crossland et al. [15], system dynamics allows brand managers to evaluate both the structure and the dynamic relationships between components of a brand management system, but traditional system dynamics lack the human-centric modeling features [20] necessary when modeling branding systems. Examples of these features are the inclusion of uncertainty into the model and linguistic definitions of the variables and the relationships among them.

One of the existing system dynamics variants is Vester's sensitivity model (VSM) [49, 50], which offers a semi-quantitative system dynamics modeling tool based on fuzzy logic [52], and has been applied to different fields of research such as environmental management and tourism [22, 44]. Its main advantages are the ease of use when discussing results with stakeholders and the utilization of feedback analysis as the core component of the modeling process. Structurally, VSM can be seen as a fuzzy cognitive map as it consists of nodes (or concepts), which are the variables, connected by edges that represent the fuzzy causal relationships between the concepts. A relationship (name effect) can be either positive (when growth of a concept stimulates growth in another) or negative (when growth of a concept inhibits growth in another).

Fuzzy logic is well known for its ability to model linguistic concepts (computing with words) [53] and it can formalize, either as an approximation or with more precision, vague concepts. The use of fuzzy sets and systems lets us move from computing with numbers to computing with perceptions [53] and it becomes natural moving from traditional system identification to more advanced identification such as in business, where product attributes and their relationships cannot be easily measurable and are defined imprecisely [34].

Fuzzy logic is a part of soft computing [9], an area of artificial intelligence focused on the design of intelligent systems to process uncertain, imprecise, and incomplete information from real-world problems. Soft computing methods frequently offer more robust, tractable, and less costly solutions compared to those obtained