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Multicriteria evaluation model for organizational performance management applied to the Polo Fruit Exporter of the São Francisco Valley

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ABSTRACT

Brazil is the world's third largest producer of fruits. Fruit growing is one of the most important sectors of Brazilian agribusiness, as it is a strategic segment for the socio economic development of the country. In the São Francisco Valley, factors such as entrepreneurship, cooperation between producers, environmental characteristics like heat, low humidity and major investments in public irrigation projects favor the management and production of high-valued fruits. Harvesting is possible in various periods of the year. However, organizational performance management in these companies directly influences the competitive environment. An important factor for the management of organizational performance is decision making. Thus, this paper proposes a decision-making model based on the multicriteria PROMETHEE II method to provide a ranking of consistent and viable alternatives for improved organizational performance management in an enterprise production and marketing of fruit located in the San Francisco Valley in Brazil. The developed model allowed the identification and context of organizational performance to manage problems and the analysis of different alternatives and criteria together. It was possible to draw action plans for the main alternatives defined in the case studied.

1. Introduction

In 2013, Brazil became the world's third largest producer of fruit, after China and India. More specifically about tropical fruits, the country remains in first place (Santos et al., 2014). The Brazilian fruit industry is highlighted in literature, especially in regard to standards and certifications used and the competitiveness that they can provide to producers and exporters. Works related to socioeconomic analysis of the production environment is also presented (Lima and Miranda, 2001; Oliveira, 2005; Guedes et al., 2007; Santos, 2008; Dorr and Grote, 2009; Goulart, 2011; Fachinello et al., 2011).

On the other hand, organizational performance management has significant impact in this sector. The way the organizational performance management reacts to a change in the competitive environment may be supplemented by the strategy, structure and organizational culture. Organizational culture in the management of a company is seminar to the organizational performance management in the technological and social process (Bititci et al., 2012; Pavlov and Bourne, 2010; Schein, 1991).

According to Franco-Santos et al. (2012) measurement and performance management has a positive aspect in many behavioral elements, organizational routines and practices, but had an overload costs that prevented some of these benefits. The performance measurement processes are elements of a strategic control system and can be used to influence organizational behavior (Lima et al., 2009; Olsen et al., 2007; Neely et al., 2005).

One factor that has been highlighted by influencing organizational performance of companies is the organizational culture. Diverse works reinforce the idea that organizational culture is directly related to organizational performance (Ahmed, 1998; Duke and Edet, 2012; Fekete and Bocskei, 2011; Zheng et al., 2010; Cameron and Quinn, 2006; Shahzad et al., 2012). The strategic importance of organizational culture has been suggested and studied by different authors, namely, Peters and Waterman (1982), Deal and Kennedy (1982), Denison (1984), Cameron and Freeman (1991), Yeung et al. (1991), who argue that success of an organization's performance is the result of their cultural characteristics.

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Another important factor for the management of organizational performance is the decision making. Models of decision-making processes related to advanced problems are intended to provide a ranked list of alternatives for the solution of a problem according to preferences set by managers. In this sense, the multi-criteria approach provides a consistent alternative to decision making (Rosakis et al., 2001).

According to Behzadian et al. (2010), the method PROMETHEE (Preference Ranking Organization Method for Enrichment Evaluations) is one of the methods of multicriteria analysis to support the latest decision developed by Brans (1982) and perfected by Brans and Vincke (1985). It is considered one of the most important methods based on outranking approach (Keyser and Peeters, 1996). The multi-criteria approach, using the PROMETHEE method was applied in different areas such as planning entrepreneurial resources, hospital management, power sector, gas supply, water recycling, information technology and analysis of air quality (Kilic et al., 2015; Amaral and Costa, 2014; Kabir and Sumi, 2014; Tavana et al., 2013;. Chen et al., 2012, 2011; Friend et al., 2011). Specifically in the agribusiness sector, the PROMETHEE II method was applied to the financial performance assessment (Baourakis et al., 2002), selection of fruits that are best suited to market conditions (Almeida and Almeida, 2012) and the prioritization of public policies to support family farming (Silva et al., 2013). These works have an approach focused on the evaluation of financial performance and selection or prioritization problems of certain variables inherent in a particular case and do not consider the organizational performance management in the scope of the decision-making process. This paper proposes a decision-making model based on the multicriteria method called PROMETHEE, specifically PROMETHEE II, which provides a ranking of consistent and viable alternatives for improved organizational performance management in producing and marketing fruit company.

2. Case study and methodology

The proposed model was applied to an agribusiness company in the industry that focuses on the production of fruit for export located in the Lower Basin region of the São Francisco Valley – in the Northeast Region of Brazil. The company has operated in the production and exportation of fruit for 10 years producing and selling seeded and seedless grapes. It has two farms that produce almost 1.519.853 kg of grapes per year, of which about 250.650 kg are for exportation.

In this sense, GlobalGAP and Tesco certifications are requirements of the European market when buying them from Brazil (Silva et al., 2014). The company currently has 45 employees in its permanent staff, and in the harvest period this number may reach 80 people.

Initially when a diagnosis process was done through a field research in order to identify problems related to organizational performance management practices as the exporters of fruits in the San Francisco Valley from that diagnosis define alternatives and criteria for the solution of related problems. In the definition of the sample the diagnosis we used for the registration of the fruit exporters was provided by the Ministry of Agriculture, Livestock and Supply (2009). The Ministry of Agriculture has 96 registered companies. 23 of them are located in the São Francisco Valley. The sample was defined in a deterministic way and took into account only the companies that voluntarily made themselves available to participation. Data collection was performed with 10 exporters of fruits and the study in case for the application of the proposed model in this paper was carried out in one of those companies. The visual PROMETHEE software was used to generate the Gaia Plane graph and for the calculus of the criteria sensibility interval. Fig. 1 shows the elaborated method for construction of multi-criteria model applied to performance management.

3. The multicriteria problem and the PROMETHEE Method II

According to Roy (1996) Methods of Multicriteria Decision Analysis – MCDA can be classified into three categories of approaches that differ according to the principles of preference modeling. It has been therefore approaches second single criterion synthesis, interactive and over-trial. The first approach is to bring together different points of view within a single function synthesis which can be further optimized. The second is mainly used for troubleshooting of multiple objectives that require a more robust mathematical programming and the third results in a ratio over-on a set of alternatives from alternatives paired comparisons (Alencar, 2006; Almeida, 2005; Roy, 1996).

The PROMETHEE method – Preference Ranking Organization Method for Enrichment Evaluations – is one of the methods of multicriteria analysis to support decisions (Brans, 1982; Brans and Vincke, 1985). The PROMETHEE method is considered one of the most important methods based on outranking approach (Keyser and Peeters, 1996). The first step of this method establishes an outranking relationship between the solutions obtained, which represents the preferences provided by the decision maker. The second is to explore the relationship over-supporting the decision-making process (Roy, 1996).

The series of PROMETHEE methods offer the decision makers the possibility of understanding concepts and parameters intrinsic to the method to simplify the modeling process of preferences and, consequently, they increase the efficiency of application of multi criteria strategies. This aspect represents a great advantage of the PROMETHEE method over other ones of overbalance such as the ELECTRE one. Besides, PROMETHEE II does not accept only one "better alternative" but offers a ranking of alternatives to support managerial procedures.

The choice of the PROMETHEE II was done in accordance with the structure of preference of the manager and the type of problems studied. In the case studied, the PROMETHEE II was applied in order to support and improve the managerial performance in the import and export of fruits. All the criteria were qualitative and the structure of preference of the decision maker attended a logical and non-compensatory approach, that is, the performance of a criteria isn't compensable by other factors. The fact that the method is easy to understand simplified the process of modeling because in many of these companies, the object of study, managers have no specific knowledge of process modeling. Thus the simplicity of the method also led to an application efficiency in the case study. The PROMETHEE II method offers a ranking of more than one possible alternative of solutions for the problem. This was decisive because the decision maker could adopt more options. On the other hand, the difficulty in using the PROMETHEE is related to the understanding of the preference functions (Brans and Mareschal, 2002). For the case study in this work, it does not represent a meaningful aspect because in such problems involving alternatives and qualitative criteria, the usual criterion is considered the appropriate one.

According to Brans and Mareschal (2002), the PROMETHEE method is easy to understand so that the concepts and parameters involved in its implementation have some physical or economic significance of rapid assimilation by the decision maker. According to Carvalho et al. (2011) the main PROMETHEE features are simplicity, clarity and stability.

A generic multicriteria problem comprises a set of alternatives (or shares) (X) and a family of criteria (J) in which the decision maker wants: