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Assessment of the "Disrupt-O-Meter" model by ordinal multicriteria methods

Luiz Octávio Gavião [a,*], Fernando Toledo Ferraz [b], Gilson Brito Alves Lima [b], Annibal Parracho Sant'Anna [c,d]

[a] *Engenharia de Produção pela Universidade Federal Fluminense – UFF, Niterói, Brazil*
[b] *Engenharia de Produção pela Universidade Federal do Rio de Janeiro – UFRJ Professor da Universidade Federal Fluminense – UFF, Rio de Janeiro, Brazil*
[c] *Estatística pela Universidade da Califórnia, Berkeley, United States*
[d] *Universidade Federal Fluminense – UFF, Niterói, Brazil*

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Abstract

The objective of this article is to explore a potential diagnostic model, called "Disrupt-O-Meter", about the Christensen's disruptive innovation theory. The diagnostic model was analyzed under multi-criteria decision aid (MCDA) methods. This diagnosis presents a typical data structure of multi-criteria ordinal problems. Different alternatives were evaluated under a set of criteria, using a scale of ordinal preferences. The steps of a MCDA problem were followed. The chosen methods were the Borda, the Condorcet and the Probabilistic Composition of Preferences (CPP). This article used a database from other research, about 3D printing technology startups. The results showed the best discrimination power by the CPP method, revealing the business category with the most disruptive potential, among other alternatives.

Keywords: Disruptive innovation; Disrupt-O-Meter; Borda; Condorcet; CPP

Introduction

Business growth is an imperative of the market, prompting executives to invest in innovation projects. However, the risks of failure of new products or services represent a counterweight to the growth strategies and configure an innovation dilemma, as described by Christensen (1997). Research on the theme in different markets led that author to assert that only one out of ten companies are able to maintain sustained growth. Therefore, understanding the circumstances surrounding an innovation process can contribute to the growth strategy with new products and services which will lead companies to include it in their statistics of success.

The decision to choose an investment or prioritize a project portfolio is recurrent in the routine of managers seeking growth. Such proceedings are under pressure from different stakeholders, as well as constraints of time and resources, among other aspects that can jeopardize the rationality in search of the best choices. In this context, the option for new investments may be aided by decision support systems, in order to reduce the subjectivity of the decision-making processes, as described by Pomerol and Barba-Romero (2012).

This article explores a diagnosis of the disruptive potential of new products or services, from the point of view of the multi-criteria decision aid (MCDA) methods. Based on the disruptive innovation theory of Christensen (1997), Christensen and Raynor (2013) and Anthony, Johnson, Sinfield, and Altman (2008) developed the Disrupt-O-Meter. This diagnosis was recently applied by Hahn, Jensen, and Tanev (2014) to assess the potential of startups in the three-dimensional (3D)

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* Corresponding author.
E-mails: luiz.gaviao67@gmail.com (L.O. Gavião), fernandoferrazuff@yahoo.com (F.T. Ferraz), glima@id.uff.br (G.B. Lima), annibal.parracho@gmail.com (A.P. Sant'Anna).

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printing market. Their results were reassessed in this article under the MCDA theory, by the application of three ordinal methods: Borda, Condorcet and the Probabilistic Composition of Preference (CPP). The application of these ranking methods allowed a better discrimination power to identify the businesses categories with greater potential for disruptive innovation.

This article presents in Section 2 a review of the literature about the disruptive innovation theory and the three MCDA methods. Section 3 shows the methodological steps of the article. Section 4 analyses the method results applied to the startup database. Finally, Section 5 presents the final research considerations.

Literature review

The literature review initially addresses the main concepts involving the theory of disruptive innovation, as described in the model of Christensen and Raynor (2013). This model was transformed into criteria by Anthony et al. (2008), for assessing the disruptive innovation potential of new products and services. For practical application, the model was adapted to a diagnosis tool, called "Disrupt-O-Meter". The evaluations of different products or services by the "Disrupt-O-Meter" criteria compose a decision matrix. Finally, the basic concepts and computation procedures of three different ordinal MCDA methods are presented in this review.

The disruptive innovation theory

The theory of disruptive innovation describes how relatively simple, convenient and low-cost innovations can be useful to the growth of companies, even with the presence of strong competitors in the industry. According to Christensen and Raynor (2013), markets exert significant pressure on executives, in order to maintain the growth of their businesses in an increasingly rapid pace. However, the authors warn that no more than 10% of the companies are able to maintain sustained growth. The theory of disruptive innovation offers a new perspective to managers from both traditional and emerging companies to preserve the vitality of their business.

The theory was first proposed by Christensen (1997) and subsequently enlarged by Christensen and Raynor (2013). Fig. 1 describes the first model, based on two axes (i.e. time and performance). A dotted line, which increases slightly up over time, depicts a rate of improvement that customers can utilize or absorb. For instance, new cars are released with engines that are more powerful than older models; however, several factors such as traffic jams, speed limits and safety concerns limit the use of all the available performance.

The normal distribution at the end of the dotted line simplifies the chart, avoiding a figure with many parallel lines, indicating a range of performance that customers can utilize. Indeed, Christensen and Raynor (2013) state that the dotted line represents the technology that is "good enough" to serve customer's needs. The region above the line shows the distribution band of high-demanding, sophisticated customers with product performance, while the region below the line shows the band of less-demanding customers, satisfied with a basic product performance.

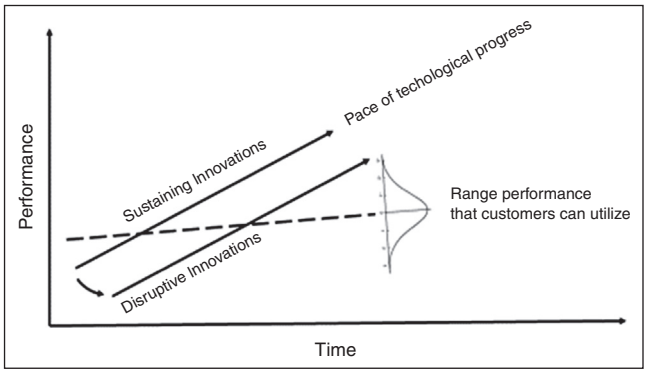

Fig. 1. Original model of disruptive innovation.
Source: Christensen and Raynor (2013).

Two solid lines in Fig. 1 represent new and improved products. These lines indicate the pace of technological progress. The solid lines are steeper than the dotted line, showing that the technological progress usually outstrips the ability of customers to use all new product features, in any given tier of the market.

These two solid lines also distinguish sustaining from disruptive innovation. A sustaining innovation targets high-demanding customers with better performance than the previous one. Incremental improvements, breakthrough technologies, leapfrog-beyond-the-competition products are some examples highlighted by Christensen and Raynor (2013). They also agree that established competitors usually engage in sustaining innovations, because this strategy involves developing better products and higher profit margins to their best customers. A disruptive innovation introduces products or services that are not as good as currently available ones. A disruptive innovation is generally simpler, more convenient and less expensive, appealing to new or less-demanding customers. This innovation redefines a new trajectory of a second solid line.

Current leaders of the industry usually focus on sustaining innovations, while entrant companies succeed in disruptive innovations. Christensen and Raynor (2013) state that the resource allocation processes are designed to support sustaining innovations. The incumbents are motivated to develop products and services up-market, leaving new or low-end markets open to new-growth businesses. Disruptive innovation may oblige the leading competitors to diversify their production lines with cheaper products or simple enough which do not justify the investment. Thus, the incoming new market does not attract the interest of these leaders to a business niche for less demanding customers who had been not met yet. For this reason, disruptive innovation is usually focused on the "low market" region.

In fact, there are two different types of disruptions, which can best be visualized by the inclusion of a third dimension to Fig. 1. The original model of disruptive innovation kept the horizontal and vertical axis, referring to performance over time. These two axes define a particular market application. Christensen and Raynor (2013) defined the first model as a value network, where customers are restricted to a plane of competition and

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