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The late-adopter scale: A measure of late adopters of technological innovations☆

Sara F. Jahanmir^{a,b,*}, Luis Filipe Lages^{b,c,1}^a Massachusetts Institute of Technology, Cambridge, USA^b Nova School of Business and Economics, Lisbon, Portugal^c MIT Sloan School of Management, Cambridge, USA

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ABSTRACT

The diffusion of innovation is an interesting topic for researchers and practitioners. However, researchers often focus on the first half of the diffusion of innovation curve, ignoring the late adopters. This article presents two studies with high-tech products (mobiles and laptops) that measure the attributes of late adopters. The first study of mobile phones uses 50 initial items. After Exploratory Factor Analysis (EFA) and Confirmatory Factor Analysis (CFA), a refined version of these items permits to develop an initial version of the late-adopter scale. The study tests the new scale on a sample of laptop users. The final scale is multi-dimensional, presents nomological and discriminant validity and has three dimensions: (1) slowness of adoption, (2) resistance to innovation, and (3) skepticism. All three late-adopter scale dimensions significantly associate with low price preference. In both samples, skepticism associates with high preference for simple products, low lead-user profile, and low product involvement. Discussion focuses on the implications of this new scale for theory and practice of new product development and diffusion of innovation in high-tech firms.

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“New product success and failure is often decided before the new product project even enters the product development phase.” (Cooper, 1988).

1. Introduction

Top marketing and management scholars have been pushing the fields of New Product Development (NPD) and innovation forward (Behrens & Ernst, 2014; Choffray & Lilien, 1978; Lester, 1936; Perreault, 2014). Cooper and Kleinschmidt (1987, p. 215) argue: “If businesses are to survive and prosper, managers must become more astute at selecting

new product winners”. Later, Kim and Srivastava (1998) show that in the case of high-tech firms with short technology cycles, developing strategies is vital to speed-up trial adoptions. Understanding the diffusion of innovation process; that is, the process of acceptance of a specific product over time by an individual linked to a social system (Katz, Levin, & Hamilton, 1963; Rogers, 1962), is critical to better comprehend why consumers adopt a product more quickly and make that product a market winner.

The diffusion of innovation curve (Rogers, 1962) introduces five adopter categories: innovators, early adopters, early majority, late majority, and laggards. Rogers argues that the adoption of innovation is a social process in which if an adopter talks to a potential adopter about an innovation which works for the first adopter, then the second one is more likely to adopt that innovation. Thus, researchers emphasize on early-adopters and their role in the diffusion process (Bohlmann, Calantone, & Zhao, 2010; Dell’Era & Verganti, 2011; Hinz, Schulze, & Takac, 2014; Huh & Kim, 2008; Iyengar, Van den Bulte, & Valente, 2011; Liao & Cheng, 2014; Van Eck, Jager, & Leeftang, 2011).

Little empirical evidence exists about the second half of Rogers’ curve: late majority and laggards, hereinafter referred to as “late adopters”. To increase the likelihood of products’ success, researchers and practitioners should target not only innovators, but also other user categories (Mahajan & Muller, 1998), particularly late adopters (Jahanmir & Lages, 2015).

Why are late-adopters important? First, before firms begin to develop new products, they must understand and monitor late adopters. A better understanding of this last 50% of users in an early stage of the NPD process allows firms to get access and use the insights of these users in their NPD process. Implementing late adopters’ insights can

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* Corresponding author at: Massachusetts Institute of Technology, E38-406, 77 Massachusetts Ave., Cambridge, MA 02139, USA. Tel: + 1 (617) 3248470.

E-mail addresses: jahanmir@mit.edu (S.F. Jahanmir), lflages@novasbe.pt (L.F. Lages).

URL: <http://www.lflages.com> (L.F. Lages).

¹ Address: Nova School of Business and Economics, Universidade Nova de Lisboa, Faculdade de Economia, Campus de Campolide, 1099-032, Lisbon, Portugal. Tel: + 351 21 3801600.

help firms convert late-adopters of current products to early-adopters of the next generation, therefore squeezing Roger's curve. Second, accurate understanding of consumers' preferences and purchase behavior contributes to innovation's diffusion and success (Shi, Fernandes, & Chumnumpan, 2014). Research shows that firms' success does not merely rely on the early but also on the continuous use of the technology (Son & Han, 2011). By identifying late adopters, firms can understand late adopters' post-adoption behavior and influence their repurchase intention.

Third, late adopters are difficult to convince about a product. They point out differences between marketing claims and delivered products (Slater et al., 2007). By using the feedback of these "opponent" users (Cavusoglu, Hu, Li, & Ma, 2010), firms can address critical market needs and remove obstacles to crossing the chasm (Moore, 2006).

Fourth, late adopters value products' core attributes. Therefore, firms can use them to increase value while cutting costs and to develop GloCal solutions to satisfy common needs across the globe. Because late adopters have different needs and expectations from those of early adopters, their unique inputs might be useful to conquer new market segments and enter emerging economies.

Finally, by identifying late-adopters of competitors and understanding their reasons for late adoption, firms can get insights about competitors' limitations and use those insights to improve the current/future generation of their own products.

Existing literature of the field lacks a clear measure to assess late adopters' attributes. Four reasons justify the need for such a measurement scale. First, researchers and firms need a measurement tool to have a clear definition of these users and to support existing conceptualizations of domains and findings in the field of diffusion of innovation. Second, different adopter groups have different characteristics (Läpple & Van Rensburg, 2011). Different authors propose different models to identify consumers' reaction to innovations (Davis, 1989; Davis, Bagozzi, & Warshaw, 1989; Läpple & Van Rensburg, 2011; Parasuraman, 2000; Ratchford & Barnhart, 2012). All these authors defend that different user categories respond differently to innovations. These differences result in different needs and expectations. The first essential step to address and fulfill late adopters' different needs is to identify them through a measurement scale. Third, although substantial advances occur in different areas of innovation and marketing metrics, these advancements have limited applicability to business reality (Lages, Silva, Styles, & Pereira, 2009). Each new product launch faces diffusion barriers. A successful product launch requires proper market preparation and supporting activities to overcome those barriers (Beard & Easingwood, 1996; Chen & Granitz, 2012; Talke & Hultink, 2010). The late-adopter scale enables firms and researchers to identify late adopters and thus understand their reasons for late adoption. Knowing those reasons prior to the launch of the next generation could help firms manage and overcome barriers to adoption. Finally, open innovation argues that good ideas do not come only from inside the organizations (Chesbrough & Crowther, 2006; Dahlander & Gann, 2010). Thus, firms require the re-establishment of their innovation system, through which external factors, such as users, appear in the NPD process (Chiaroni et al., 2010). After identifying late adopters, firms intending to implement open innovation can include these users in their innovation process and benefit from their insights. For example, if manufacturers know that a set of late adopters exists for a specific generation of products, those manufacturers could establish priorities in their NPD process by listening to the previously ignored voices of these unsatisfied users.

2. Measurement of late adoption

The literature refers to technology innovation as a critical aspect of industrial competitiveness (da Silveira, 2001). Therefore, to develop a measurement scale to assess characteristics of late adopters, this study focuses on technologies: mobile phones and laptops. Previous

research defines late adopters building on their personal attitude as well as their attitude toward products (Moore, 2006; Rogers, 2003). Following these works, this study's scale presents three dimensions, representing major attributes of late adopters: (1) slowness of adoption (SLOW_ADOPT), (2) resistance to innovation (RES_INNOV), and (3) skepticism (SKEPT). All items belong to Rogers (2003) and Moore's (2006) description of adopter categories.

The first dimension, slowness of adoption, refers to the amount of time that individuals take to adopt (Rogers, 2003). Adoption over time is critical to evaluate diffusion of innovation. This construct assesses whether the user belongs to the group of adopters who adopt the product later than others (Uhl, Andrus, & Poulsen, 1970). The second construct, resistance to innovation, appears as a case of resistance to change (Bagozzi & Lee, 1999; Tsinopoulos, Lages, & Sousa, 2014). The literature indicates that late adopters are not only resistant to change, but also suspicious of agents of change. Late adopters want to be certain that an innovation does not fail before they adopt it (Rogers, 2003). Uncertainty is a key factor in the process of diffusion (Rogers, 2003) and plays an important role in the adoption of technological innovations. Thus, the third construct, skepticism, describes users' doubtful approach toward innovations and the benefits that novel products provide (Rogers, 2003; Slater et al., 2007).

3. Study 1: the case of mobile phone adopters

3.1. Research setting and survey instrument development for study 1

Study 1 focuses on users of mobile phones. Pre-testing comprises three stages. The first stage involves the refinement of the survey instrument and cover letter. The initial survey consists of 50 items drawing from user characteristics appearing in the work of Rogers (2003) and Moore (2006) together with other critical related factors from established literature in innovation. The second stage involves refining the measures through interviews with people capable of understanding the nature of the concept being measured Churchill (1979). Finally, the third stage consists of refining the survey instrument with academic judges and product users. Several judges (university lecturers in marketing, finance, and sociology) assess the content and face validity of the items.

To assess informants' proper understanding of the survey instrument, respondents indicate their level of English (from zero to native). The study excludes those with low level of English. Respondents assess all items using a 5-point Likert scale (from "1 – strongly disagree" to "5 – strongly agree"), considering their experience with their own mobile phone.

3.2. Data profile and assessment of non-response bias for study 1

A questionnaire provides the data. The sample builds on the criteria of having and using a mobile phone. Following earlier research (Batra, Ahuvia, & Bagozzi, 2012), the study uses a sample of graduate-student mobile phone users (52.4% male and 47.6% female) with an average age of 26 (85% between 20 and 30 years old and 15% over 30). Out of the 135 mobile phone user participants we obtain a final valid sample of 105 users with high level of English. We test non-response bias by assessing the differences between the early (the first 75%) and late (the final 25%) respondents of completed questionnaires with regard to the means of all the variables (Armstrong & Overton, 1977). No significant differences exist between the two groups of questionnaires.

3.3. Measurement model of study 1

To conduct exploratory factor analysis (EFA), and because of sample size limitations, the initial 50 items were divided into two groups building on Rogers' and Moore's description of late adopters: the first group of 31 items referring to users' attitude toward a product and the second

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