

Individual and cultural factors affecting diffusion of innovation

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ABSTRACT

Several research studies attempted to study and analyze the factors that affect innovation diffusion. However, the focus was on the innovation attributes rather than the individual factors that help or prevent innovation acceptance and diffusion. This paper advances a conceptual model that integrates individual and cultural factors that affect acceptance and diffusion of innovations. Individual factors include the roles of lead users and opinion leaders, while cultural factors are represented by uncertainty avoidance and individualism. This model aims to link all factors in order to help managers manage the innovation process optimally in different markets. It is recommended to identify the key groups that would support the process; including lead users (inventors) and opinion leaders (promoters); as well a unique groups that combines both characteristics (champions). Online communities are the contemporary tool that could be used in order to best utilize the above groups. Further, cultural factors, such as individualism and uncertainty avoidance should be considered in order to optimize the efforts and maximize innovation diffusion.

Keywords: Diffusion of Innovation, Lead Users, Opinion Leaders, Uncertainty Avoidance, Individualism

INTRODUCTION

The high failure rates of a substantial number of innovations in the marketplace are of concern to both marketing researchers and managers. A possible reason for these failure rates is the inappropriate application of innovation diffusion models (Deffuant, Hut & Amblard, 2005; Hassan, Mourad & Tolba, 2010). Another possible reason is the difficulty to evaluate the factors associated with accelerating the rate of diffusion (Zhu & Kraemer, 2005). Consequently, a better understanding of the factors influencing innovation diffusion is becoming a top priority for marketing researchers and managers, particularly those in high-tech firms.

There are a number of research studies that theoretically and empirically investigated the influence of lead users on the innovation process as they modify the existing products to be later developed by firms to become commercial products (von Hippel, 2005; Franke & Piller, 2003; Henkel & von Hippel, 2005; Lüthje & Herstatt, 2004; Franke, Von Hippel, & Schreier, 2006; van Oast, Verhaegh, & Oudshoorn, 2009, Hassan et al., 2010). It is argued that this lead-user innovation approach helps the firm reduce the risk of failure associated with introducing new products to the market. As a result, investigating the influence of lead users on accelerating diffusion rate offers far greater benefits in comparison with the traditional innovation diffusion models.

Further, in order to accelerate the rate of diffusion, it is crucial to target opinion leaders. The opinion leader is usually among the first adopters of new products and uses word-of-mouth communication skills to influence the behavior of other people in terms of search, purchasing and usage of new products (Goldsmith & Witt, 2005; Gupta & Rogers, 1991; Dearing, 2009; Hassan et al., 2010). Generally, the communication of opinion leaders are informal, however, they play a major role in influencing the consumer decision-making process as they represent a reliable source of information. As a result, marketers attempt to create communication channels to reach opinion leaders in order to encourage them to spread positive word-of-mouth (Lyons & Henderson, 2005).

Additionally, research indicated that cultural factors significantly influence the innovation adoption process (Karahanna, Evaaristo & Strite 2002; Meyers & Tan 2002; Huang et al. 2003). However, little research analyzed the effects of cultural factors on innovation acceptance and diffusion (Kalliny & Hausman 2007).

This paper advances a conceptual model that integrates individual and cultural factors that affect acceptance and diffusion of innovations. Individual factors include the roles of lead users and opinion leaders, while cultural factors are represented by uncertainty avoidance and individualism. This model aims to link all factors in order to help managers manage the innovation process optimally in different markets.

INNOVATION ACCEPTANCE

Innovations are defined in this paper as the new technical products, scientific knowledge, application methods, and tools that facilitate problem solving for potential adoption. Different adopters perceive and assess innovation in a variety of ways. Rogers (1983; 2003) suggests that analysis of innovations should be made in the context of the potential adopter's own perspective and situation; in other words, to emphasize the subjective nature of innovations. Robertson and Gatignon (1986) suggest that this subjective approach is likely to differ from the descriptions of

innovations, which are provided by a manufacturer or distributor. This suggests that perception of subjective characteristics of innovations will affect the outcome of the adoption decision.

Considerable efforts by diffusion researchers indicated that adoption decisions followed a hierarchy of effects model that led to the cognitive assessment of cost/benefits associated with innovations (Rogers, 1962, 2003; Fliegel & Kivlin 1966; Rogers & Shoemaker 1971; Zaltman & Stiff 1973; Franke, et al, 2006, Deffuant et al, 2005; Hafeez, Keary, & Hanneman, 2006; Straub, 2009). Investigations of adoption decisions have gained broader recognition when marketing researchers became concerned with acceptance of innovations. Consequently, the new product adoption process is most often viewed as a hierarchal sequence from knowledge/awareness and evaluation to full adoption (Robertson 1971; Hafeez et al., 2006; Zhu & Kraemer, 2005). It is argued that communication of information about new products is essential in order to create positive perception of the benefit and favorable attitude toward the innovation being described (England & Stewart, 2007). Traditional diffusion models (Rogers, 1983) are based on the assumption that making consumers aware of innovations will produce positive attitudes, which will facilitate acceptance. It is assumed that consumers act on their perceptions, once they become aware of the desirability of adopting a particular innovation. Once the consumer becomes aware of a felt need and possesses the means to satisfy the need, he or she begins a process of innovation evaluation.

INNOVATION ATTRIBUTES

It is generally agreed that innovation attributes are important considerations for potential adopters. Rogers (1983, 2003) observed that potential adopters assess the following attributes of innovations: relative advantage, compatibility, complexity, trial-ability, and observability. Relative advantage refers to the uniqueness of need value and the financial return (Rogers, 1983; Bulte, 2000; Takada & Jain, 1991; Gupta & Rogers, 1991; Morrison, Roberts & Von Hippel, 2000; Straub, 2009). Compatibility refers to compliance with customers' existing values, past experience, and needs of potential adopters (Rogers, 1983; Gupta & Rogers, 1991; Straub, 2009). Complexity is the extent the product is perceived as difficult to understand and use (Rogers, 1983; Gupta & Rogers, 1991; Straub, 2009). Trial-ability is the extent the product can be experimented (Rogers, 1983; Gupta & Rogers, 1991; Straub, 2009). Finally, observability means that the results of innovation are visible to others (Rogers, 1983; Gupta & Rogers, 1991; Straub, 2009).

Additionally, March (1994) observed the importance of other attributes like usability and sociability. Other factors that were found important in the innovation process are communicability (Goldsmith & Witt, 2005; Gupta & Rogers, 1991; Lyons & Henderson, 2005; von Hippel, 2005 ; Takada & Jain, 1991 ; Morrison et al, 2000; Straub, 2009); socio-economic and demographic factors (Bulte, 2000; Takada & Jain, 1991; Forlani & Parthasarathy, 2003; Yenyurt & Townsend, 2003); and marketing mix variables (Bulte, 2000; Gupta & Rogers, 1991; Takada & Jain, 1991; Straub, 2009).

This study focuses on the most commonly used attributes (Relative Advantage, Compatibility, Complexity, Trial-ability, and Observability). It is proposed that Relative Advantage and Complexity represent the “functional dimension” of the innovation; while Compatibility, Trial-ability and Observability represent the “social dimension” of the innovation. Complexity negatively affects innovation acceptance, while the other four factors have a positive effect.

- P1: Innovation Attributes affect Innovation Acceptance
- P1a: Relative Advantage positively affects Innovation Acceptance
- P1b: Compatibility positively affects Innovation Acceptance
- P1c: Complexity negatively affects Innovation Acceptance
- P1d: Trial-ability positively affects Innovation Acceptance
- P1e: Observability positively affects Innovation Acceptance

While innovation attributes are expected to affect innovation acceptance, it is crucial to consider the role of lead users in improving such attributes in the development process, as well as while modifying the products to further foster innovation adoption. The next section details the role of lead users in the innovation process.

LEAD USERS AND INNOVATION PROCESS

Lead users are defined as being in advance of the market in terms of their needs, motivations and qualifications (Urban & von Hippel, 1988; Lüthje & Herstatt, 2004; von Hippel & Katz, 2002; Hienerth, 2006; Bilgram, Brem & Voigt, 2008; Morrison et al, 2000). As a result, they have unique characteristics in comparison with the mainstream consumers such as consumer knowledge, use experience, locus of control, motivation and innovativeness (Schreier & Prügl, 2008; von Hippel, 1986; Morrison et al, 2000; Franke, et al, 2006). In addition, another characteristic is the tendency to spread positive word-of-mouth about their innovation that results in increasing the rate of diffusion (von Hippel, 2005; Hienerth, 2006). This was empirically proven as lead users used to freely reveal information about the products that they have developed in order to enhance their reputation (Franke, et al, 2006, Bilgram et al, 2008; van Oast et al., 2009; von Hippel, 2005; Hienerth, 2006; von Hippel & Finkelstein, 1979; Franke & Shah, 2003).

Traditionally, organizations utilized a classical product development method for new products in the marketplace (Gupta & Rogers, 1991). This method is characterized by high-risk due to the uncertainty associated with the development of new products. That is to say that this approach helps the organizations to minimize the risk by developing new products that translate customers' needs and hence increase the probability that they would be accepted in the market (Henkel & von Hippel, 2005; Deffuant et al, 2005; Franke, et al, 2006).). It is argued that the participation of customers in the innovation process might minimize risk (Lüthje & Herstatt, 2004; Deffuant et al, 2005; Hafeez et al., 2006).

A number of researchers studied the frequency of users' innovations and found that large numbers of users develop their own products (Franke & Piller, 2003; von Hippel 1986; Deffuant et al, 2005; Piller & Walcher, 2006), and others play a major role in developing new products based on their previous experience (Lüthje & Herstatt, 2004; von Hippel, 1986; Franke, et al, 2006). Further, empirical research studies proved that there are highly significant correlations between lead users and innovations by users in many main industries (von Hippel, 2005; Franke, et al, 2006). As a result, the new lead user innovation method was adopted by several organizations like 3M, Adidas, Lego, and BMW (von Hippel, Thomke & Sonnack 1999; Morrison et al, 2000). This approach helps the organizations to develop new products that are accepted by the market (Henkel & von Hippel, 2005; van Oast et al., 2009). Accordingly, the possibility of an accelerated rate of diffusion is far greater in comparison with the traditional innovation method (von Hippel, 2005; van Oast et al., 2009).

Further, several researchers attempted to theoretically and empirically investigate the influence of lead users on the innovation process as they modify the existing products to be later developed by firms to become commercial products (Morrison et al, 2000). It is argued that this lead-user innovation approach helps the firm to reduce the risk of failure associated with introducing new products to the marketplace (Henkel & von Hippel, 2005; Lüthje & Herstatt, 2004; Hienerth, 2006). This user-centred innovation processes “offer greater advantages over the manufacturer-centric innovation development systems that have been the mainstay of commerce for hundreds of years” (von Hippel, 2005, P1). As a result, investigating the influence of lead users on accelerating diffusion rate offers far greater benefits in comparison with the traditional innovation diffusion model. However, there are limited research studies that comprehensively evaluated the influence of lead users’ innovations on the rate of diffusion (Morrison et al, 2000; Hienerth, 2006; Bilgram et al., 2008; Hassan et al., 2010).

Other researchers have championed lead user characteristics as the most effective method for the innovation development process (von Hippel, 2005; Franke & Piller, 2003). Hence, it was conceptually and empirically proven that the participation of lead users in the innovation process, results in a higher accelerated rate of diffusion of the new products (von Hippel, 2005; Franke, et al, 2006; Hienerth, 2006; Bilgram et al, 2008; van Oast et al., 2009; Straub, 2009; Franke & Piller, 2003; Morrison et al, 2000; Henkel & von Hippel, 2005; Lüthje & Herstatt, 2004; Lyons & Henderson, 2005).

This study proposes two roles to lead users in the innovation adoption process. First, lead users are expected to support the development process of innovation in a way that renders innovation attributes more appealing. It is conceptualized that lead users’ effect will be stronger on functional attributes; Relative Advantage and Complexity. Lead users should be capable of finding ways to increase the value of the new innovation as well as render it more understandable by normal consumers

P2: Lead Users’ Involvement positively affects Functional Innovation Attributes

P2a: Lead Users’ Involvement positively affects Relative Advantage

P2b Lead Users’ Involvement negatively affects Complexity

In addition, most of the organizations are working on line extensions and modifying existing products rather than creating new products (von Hippel et al., 1999; Franke, et al, 2006).Therefore, the role of lead users should extend from the development stage to the modification stage of innovation in order to facilitate the adoption process; which in turn lead to innovation diffusion.

P3: Lead Users’ Involvement moderates the relationship between Innovation Attributes and Innovation Acceptance

INNOVATION DIFFUSION

Diffusion can be defined as the process by which a new innovation is communicated through mass media as well as word-of-mouth in a specific market (Forlani & Parthasarathy, 2003; Deffuant et al, 2005; Hafeez et al., 2006).It is “the process by which an innovation is communicated through certain channels over time among the members of a social system” (Rogers, 1983, p34).

Several researchers studied the diffusion theory and empirically tested it across various industries and countries. It was concluded that the rate of diffusion is influenced by macroeconomic and demographic factors in addition to the microeconomic factors relating to the product attributes (Bulte, 2000). They were trying to study the time taken for an idea or a product to be adopted in the market (Bulte, 2000; Gupta & Rogers, 1991; Lüthje & Herstatt, 2004; Hafeez et al., 2006; England and Stewart, 2007; Straub, 2009).

It should be noted that the introduction of innovations is influenced by a complexity of factors both controllable and uncontrollable by the firm (Urban & Hauser 1980; Gupta & Rogers, 1991; Rogers, 2003; von Hippel, 2005; Zhu and Kraemer, 2005; Straub, 2009). Accordingly, Innovation Acceptance is thought to be a prerequisite to Innovation Diffusion.

P4: Innovation Acceptance Affects Innovation Diffusion

Some diffusion researchers have long maintained that a particular set of factors such as evaluation of innovation attributes and opinion leadership variables are the best predictors of diffusion rates (Goldsmith & Witt, 2005; Morrison et al., 2000; Hafeez et al., 2006; Hassan et al., 2010). The next section explores the role of opinion leaders in the diffusion process.

OPINION LEADERS AND INNOVATION DIFFUSION

A number of researchers believed that products that are recently launched in the market diffuse faster in comparison with the situation several years ago (Bulte, 2000). This fact is a result of the emergence of different players in the market. One of the main players that accelerate the diffusion process is the opinion leader (Forlani & Parthasarathy, 2003). This is supported by Rogers (1983), who proved that opinion leaders have major roles in “activating diffusion networks” (p307). In addition, a number of diffusion researchers have long maintained that a particular set of factors such as evaluation of innovation attributes and opinion leadership variables are the best predictors of diffusion rates (Goldsmith & Witt, 2005; Morrison et al., 2000; Rogers 2003; Dearing, 2009; Hassan et al., 2010).

Opinion leaders are identified as having greater access to mass media as well as interpersonal networks in comparison with their followers. In addition, they are perceived as having higher socio-economic status and tendency to adopt new innovative ideas before their followers (Rogers, 2003; Dearing, 2009; Myers & Robertson, 1972; Lyons & Henderson, 2005). Their main characteristics are knowledge (Goldsmith & Witt, 2005; Myers & Robertson, 1972; Childers, 1986; Lyons & Henderson, 2005; Eastman, Eastman, Eastman, 2002; Rogers, 1983,2003); social influence (Myers & Robertson, 1972; Goldsmith & Witt, 2005; Rogers, 1983,2003); innovativeness (Myers & Robertson, 1972; Lyons & Henderson, 2005; Goldsmith & Witt, 2005; Rogers, 1983,2003); and interpersonal factors (Myers & Robertson, 1972; Goldsmith & Witt, 2005; Lyons & Henderson, 2005; Rogers, 1983,2003).

It was empirically proved that opinion leaders influence the consumer decision-making process through spreading positive word of mouth. In addition, they act as a role model to be imitated (Goldsmith & Witt, 2005; Dearing, 2009). This relationship was supported by the diffusion research, which highlight that opinion leaders influence the evaluation of new innovation and hence they affect the rate of diffusion (Gupta & Rogers, 1991; Lyons & Henderson, 2005; Rogers, 2003; Dearing, 2009).

P5: Opinion Leaders' Involvement moderates the relationship between Innovation Acceptance and Innovation Diffusion

THE ROLE OF CULTURE IN INNOVATION ACCEPTANCE AND DIFFUSION

While most innovation research has focused on the innovativeness of the idea, there is an urgent need to consider consumers' perceptions of the adoption (Kalliny & Hausman, 2007). Takada and Jain (1991) confirmed that diffusion of innovation is greater in high-context cultures. Further, the adoption of IT products is not fully understood; partially because of the lack of fit between technology and culture (Ronen & Shenkar, 1985; Newman & Nollen 1996; Soh & Sia 2004). It is claimed that the value system of the individual is critical to innovation adoption (Daghfous et al., 1999). Therefore, there is an urgent need to analyze the effect of cultural characteristics on the innovation diffusion process. This study links two main cultural dimensions of Hofstede measures; Individualism/Collectivism and Uncertainty Avoidance, on innovation acceptance and diffusion.

Individualism and Innovation

Individualistic and Collectivism is the most critical factor that affects innovation adoption (Triandis 1995; Steenkamp, Hofstede & Wedel 1999; Chandrasekaran & Tellis 2008; Flight et al. 2011, Dwyer, Mesak & Hsu, 2005). An individualist society is characterized by reliance on personal beliefs in making decisions, and group norms are not strictly followed (Roth 1995; Steenkamp, Hofstede & Wedel 1999; Perez-Alvarez, 2009). On the other hand, group consensus is critical to decision making in collectivist societies (Wickliffe & Pysarchik 2001). In individualist societies, people tend to be involved in several "out-group" that affect their decisions in the long-term; while collectivist societies are linked to one "in-group" that affects their decisions in the short-term (Triandis et al. 1988; Harris & Nibler 1998). Accordingly, it is argued that Innovation Acceptance at the early stage of the innovation is fostered in collectivist societies, where in-groups are influential. On the other hand, Innovation Diffusion is influenced by the various out-groups in individualist societies (Dwyer et al., 2005).

P6a: Individualism mediate Innovation Acceptance

P6b: Individualism suppresses Innovation Diffusion

Uncertainty Avoidance and Innovation

Uncertainty Avoidance is another critical cultural dimension that influences innovation adoption. It refers to the level of tolerance to risk (Hofstede 2001; Dwyer et al., 2005). A high Uncertainty Avoidance leads to a generation of rigid rules within the society, and is expected to slow the acceptance and diffusion of innovations (Kalliny & Hausman 2007; Perez-Alvarez, 2009).

P7a: Uncertainty Avoidance mediate Innovation Acceptance

P7b: Uncertainty Avoidance mediate Innovation Diffusion

PROPOSED CONCEPTUAL MODEL

This study offers a conceptual model that incorporates both individual and cultural factors that affect innovation acceptance and diffusion. Figure 1 highlights all model relationships. The model is divided into two stages. First, lead users affect innovation attributes, particularly the functional ones. Second, innovation acceptance is affected by the innovation attributes and moderated by lead users' involvement (an individual factor) and cultural factors (uncertainty avoidance and individualism). Third, innovation diffusion is affected by innovation acceptance and moderated by opinion leaders' involvement (an individual factor) and individualism cultural factors (uncertainty avoidance and individualism). The conceptual model is presented in Figure 1 in the Appendix.

CLASSIFYING LEAD USERS AND OPINION LEADERS

Based on the above model, companies could possibly classify consumers into either lead users or opinion leaders or normal consumers (followers). It is argued in the literature by a number of researchers such as Myers and Robertson (1972) that opinion leaders are not innovators, and there is a moderate relationship between opinion leadership and innovative behavior.

However, Goldsmith and Witt (2005) proved a positive correlation between innovativeness and opinion leadership across several product categories. This is also supported by Rogers (1983) who proved that "opinion leaders are more innovative than their followers" (p.284). Also, Goldsmith and Witt (2005) identified opinion leadership as one of the dimensions of lead users. In addition, a number of researchers mentioned that innovation is one of the main attributes of opinion leadership (Myers & Robertson, 1972; Lyons & Henderson, 2005). Further, lead users could act as opinion leaders and hence spread positive word of mouth about the product, which will positively affect the rate of diffusion (Morrison et al, 2000; Bilgram et al, 2008).

Accordingly, Figure 2 in the Appendix, demonstrates all possible consumers targeted by companies while introducing a new innovation to the market. Figure 2 in the Appendix, identifies four groups of consumers: Champions; Inventors; Promoters; and Followers. Inventors are lead users characterized by a high level of innovation and willingness to contribute ideas for new product development. Promoters are opinion leaders who like to try new innovations and are willing to spread word-of-mouth to convince other consumers to try them. Followers are normal consumers who do not buy the products until other consumers try them. Finally, Champions are characterized by both lead users' and opinion leaders' characteristics. These are very important consumers to target as they both help in the design and modification processes to ensure innovation acceptance; and at the same time they are willing to spread positive word-of-mouth to help in innovation diffusion among followers. Identifying the above groups is critical to companies eager to introduce successful innovations on a regular basis. In this case, lead users could act as opinion leaders and hence spread positive word of mouth about the product, which will positively affect the rate of diffusion (Morrison et al, 2000; Goldsmith & Witt, 2005; Myers & Robertson, 1972; Lyons & Henderson, 2005; Franke, et al, 2006). This is possible if these lead users possess social influence capabilities.

CONCLUSIONS & MANAGERIAL IMPLICATIONS

This paper advances an integrative model of innovation diffusion that incorporates the effects of innovation attributes, lead users, opinion leaders and cultural factors on innovation acceptance and diffusion. Lead users are proposed to affect both innovation development and modification. Their role is critical to optimize the effect of functional attributes, such as relative advantage and complexity. Also, while opinion leaders affect innovation diffusion, their role could be amplified at an earlier stage in order to affect social attributes.

Culture is thought to have a significant role in the innovation diffusion process. In individualistic cultures, innovations require more time to be accepted than in collectivist cultures. On the other hand, diffusion is faster than in collectivist societies. Marketers should utilize lead users and opinion leaders effectively in different cultures, depending on the urgency of the situation. Similarly, Uncertainty Avoidance was found to slow down innovation acceptance and diffusion due to the inherent risk aversion in the society. Lead users' role is critical to decrease complexity and increase relative advantage to attract users to adopt the innovation; while opinion leaders are crucial to drive innovation diffusion in such tough conditions.

Communicability is crucial to the innovation adoption process, as it incorporates the role of word-of-mouth through both lead users and opinion leaders, along with other interpersonal networks. Accordingly, it is recommended to identify Champions (Lead Users and Opinions Leaders are the same time) at the early stages of the innovation development in order to optimize all innovation attributes.

After identifying Champions, Inventors, and Promoters, marketers will face the challenge of encouraging them to help in the development process as well as communicate and drive word-of-mouth to drive diffusion. One way to do so is to rely on online communities. The Online community is referred to as "virtual communities" (Rheingold 1993; Rothaermel & Sugiyama 2001). It is defined as a community where people come together around a common goal and share common interest using internet channels like email, chat rooms or internet user group (Hagel & Armstrong 1997; Williams & Cothrel 2000). Online communities' participants exchange information, knowledge and reviews around service, product or a common interest. Virtual communities create a new medium where like-minded strangers come together regardless of their physical location and not constrained by time. Through virtual communities people have the chance to share experience and learn from each others, meeting their social and commercial needs. Online communities could be useful in two ways. First, companies are encouraged to develop an online community for Champions, aiming to attract customers that would act as both lead users and opinion leaders. This way, they can post their recommended modifications online as well as creative ideas for new products. Second, companies need to form online communities for opinion leaders, whereby interested users are encouraged to chat around the product, provide recommendations and referrals, and invite potential followers. This could be an effective credible word-of-mouth tool to drive innovation diffusion.

In summary, companies should consider the best use of lead users and opinion leaders, while considering cultural factors, in a way that maximized innovation diffusion.

AGENDA FOR FUTURE RESEARCH

It is recommended to empirically test the study's model on different types of innovations across different cultures. Also, researchers are encouraged to conduct studies that would help identify

the different groups (Champions, Inventors, Promoters and Followers). Further, future research should attempt to test the model's research propositions, and possibly add factors that would help predict innovation diffusion more effectively. Additionally, further studies could consider other cultural factors, such as Power Distance, Masculinity and Long-Term Orientation to explore whether they have an effect on the innovation process. Finally, empirical studies should consider different products and stages of diffusion in order to differentiate short-term and long-term diffusion rates, particularly in different cultures.

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APPENDIX

Figure 1: Innovation Diffusion Conceptual Model

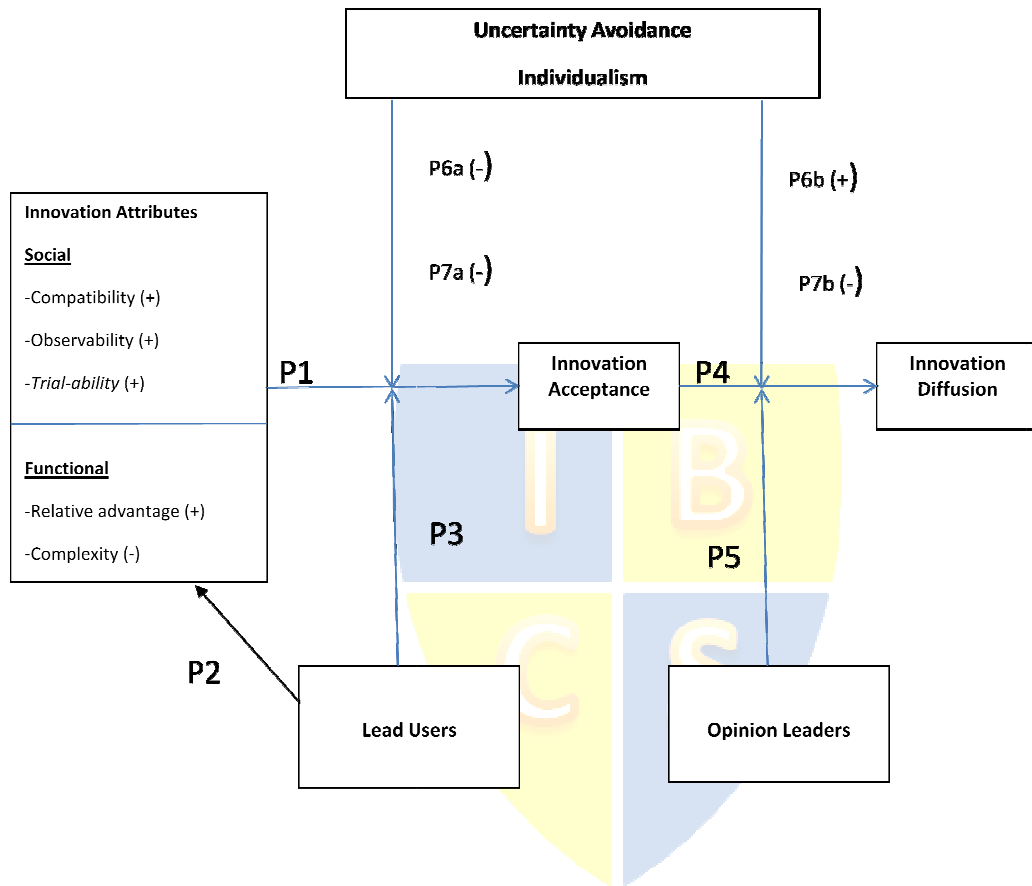


Figure 2: Consumer Classifications

Opinion Leader Level	Lead User Level		
		High	Low
	High	Champions	Promoters
Low	Inventors	Followers	

