

**Lead users and the adoption and diffusion of new products:**

**Insights from two extreme sports communities**

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## **Lead users and the adoption and diffusion of new products:**

### **Insights from two extreme sports communities**

**Abstract.** Lead users are proposed as a valuable resource for marketers in terms of the (1) development, (2) adoption, and (3) diffusion of new products. We present the first consumer study to provide evidence that the latter two suggestions are justified. First, we find that lead users demonstrate stronger domain-specific innovativeness than more “ordinary” users. Second, lead users perceive new technologies as less “complex” and might therefore be better prepared to adopt them. Third, we find that lead users demonstrate stronger opinion leadership and weaker opinion seeking tendencies. Finally, we discuss the implications of our findings for the marketing of new products.

**Keywords:** Lead users, user innovation, adoption, diffusion, new products, opinion leadership

The concept of lead users has recently gained much attention outside the marketing discipline – particularly in the field of innovation management (Franke, von Hippel, and Schreier 2006, Lilien et al. 2002, Morrison, Roberts, and Midgley 2004, von Hippel 1986, Urban and von Hippel 1988). In addition to discussing the implications for product development, these studies also provide some initial conceptual arguments indicating that lead users might be highly valuable to marketers.

Within the marketing field, however, we are only aware of one study that has taken an empirical approach to the notion of lead users thus far (Morrison, Roberts, and Midgley 2000). We follow suit and provide initial evidence that lead users might not only play an important role in the development but also in the adoption and diffusion of new consumer products.

First, lead users, that is, users in a given domain who are ahead of an important marketplace trend and experience high benefits from innovating (von Hippel 1986), are said to come up with attractive user innovations themselves in order to meet their leading-edge needs which cannot be satisfied by commercially available products (Urban and von Hippel 1988, von Hippel 1986). As those needs

might foreshadow general demand, the problems and solutions encountered by lead users today might be highly relevant to broader parts of the market tomorrow (von Hippel 1986). Several empirical studies provide strong support for lead user theory (Urban and von Hippel 1988, Morrison, Roberts, and von Hippel 2000). Franke, von Hippel, and Schreier (2006), for example, surveyed European kite surfers and found that kite surfers' leading-edge status significantly helps to explain both user innovation likelihood as well as the commercial attractiveness of user innovations.

The practical implications are straightforward: Companies should try to harness this innovative potential by integrating lead users into the development of new products. In the "lead user method" (von Hippel 1986, Urban and von Hippel 1988), companies have started to learn from leading-edge users about the needs and solutions they encounter at the forefront of the market. The ultimate goal is to derive promising new product concepts generated in the course of workshops where lead users collaborate with company personnel. The potential promise of this new, market-driven approach to idea generation has been highlighted by several case studies (Herstatt and von Hippel 1992, Olson and Bakke 2001, Gruner and Homburg 2000). Lilien et al. (2002), for example, find that lead user concepts developed at 3M outperform traditionally developed concepts by a wide margin (see also Lüthje and Herstatt 2004 for a recent review on the lead user method).

Second, it has been proposed that their leading-edge status might not only explain why lead users tend to innovate, but also why they tend to adopt new products more heavily and more quickly than "ordinary" users (Morrison, Roberts, and Midgley 2004, Urban and von Hippel 1988). If we find empirical support, this would suggest that companies might be able to employ "leading-edge status" as a new and concrete positioning variable for the marketing of new products. In contrast to the first lead-user implication (i.e., development of new products), however, systematic empirical evidence is still lacking. The only exception is the study conducted by Morrison, Roberts, and Midgley (2004) in a business-to-business setting. They identify a positive relationship between libraries'

leading-edge status and their adoptive behavior, measured in terms of an organization's dispositional innovativeness, time of adoption, and number of innovations adopted.

Third, it has been proposed that lead users might be relevant to the diffusion of new products, as their leading-edge status might empower them to serve as a field's opinion leaders (Morrison, Roberts, and Midgley 2000, Urban and von Hippel 1988). If we find empirical support, companies could systematically target lead users in order to have them help speed up the diffusion process of new products. However, as with the adoption of new products, empirical evidence is only available to a very limited extent. The only study we are aware of – again conducted in a business-to-business setting – is provided by Morrison, Roberts, and Midgley (2000), who report a significant relationship between libraries' leading-edge status and their opinion leadership.

Against this background, this paper aims to shed some initial light on the link between consumers' leading-edge status and the adoption and diffusion of new products. This seems particularly relevant for consumer goods fields, as most of the existing studies have focused on industrial lead users. The findings of similar studies obviously provide only very limited insight into the behavior of the consumer (Gatignon and Robertson 1985). In our analysis, we therefore concentrate on individual end-users (i.e., consumers) as opposed to user-companies. In particular, we develop the relationship between consumers' leading-edge status and (a) their domain-specific innovativeness, (b) their perceived complexity of recently introduced innovations (both relevant to the adoption of new products), and (c) their opinion leadership or opinion-seeking tendencies (both relevant to the diffusion of new products). Our hypotheses are tested in the course of two studies on extreme sports communities (kite surfing and technical diving).

## **1. Definition of lead users and hypotheses**

Lead users in a given domain are defined as users who “face needs that will be general in a marketplace – but face them [...] before the bulk of that marketplace encounters them, and [...] are

positioned to benefit significantly by obtaining a solution to those needs” (von Hippel 1986, p. 796). Note that being a lead user should not force a dichotomous answer; instead, the degree of leading-edge status has been reported to follow a unimodal distribution (Morrison, Roberts, and Midgley 2004). Lead users thus tend to be “ahead of an important marketplace trend” and tend to experience “high expected benefits” from innovating (Franke, von Hippel, Schreier 2006, p. 302). The idea of lead users fits in well with the basic tenet of diffusion theory, which states that technologies and products as well as needs and tastes do not hit the entire market simultaneously. Instead, there are always some individuals or organizations that perceive needs earlier than others (Rogers and Shoemaker 1971).

The well-known case of the mountain bike provides an illustrative overview of who lead users are and why they might be valuable in the design and marketing of new products. In the early 1970s, some enthusiastic users started to experience a strong need to ride off-road, whereas the mainstream of the market tentatively continued to stick to paved roads (Lüthje, Herstatt, von Hippel 2005). The former were thus leading the trend of taking their bikes into the back country (i.e., they were ahead of the trend). The equipment available commercially at that time was clearly insufficient to satisfy those needs, making those users experience a strong need to innovate (high expected benefits).

In response, these users started to develop a strong understanding of how ordinary street bikes had to be adapted to suit this new application and finally developed the mountain bike (user innovation). As we know today (the mountain bike industry generates billions of dollars in sales), the needs experienced by these leading-edge users foreshadowed general demand (commercially attractive innovation). As these trends continue to evolve (e.g., pushed by leading-edge users to ride on ever steeper and rockier terrains), this mechanism is not restricted to an industry’s earliest days. In fact, the share of user innovators in highly mature fields has been reported to be as high as 30% (Franke and Shah 2003).

Against this background, it seems plausible, however, that lead users will not only come up with attractive innovations themselves. Instead, they will also benefit strongly from adopting new commercial products tailored to their needs once they become available. They might also perceive lower barriers to adoption, as their leading-edge status in particular will better equip them to evaluate an innovation's potential performance. Finally, they might also serve as role models and strong opinion leaders in the field, causing broader parts of the market to follow. We develop our propositions in more detail below.

*(1) Lead users and domain-specific innovativeness.* Domain-specific innovativeness refers to an individual's tendency to adopt new products within a given field of interest (Goldsmith and Hofacker 1991). This latent construct theoretically reflects (Midgley and Dowling 1978) and empirically predicts (Goldsmith and Hofacker 1991) actualized behavior like time and likelihood of adoption in relation to a particular innovation (Roehrich 2004). We propose that lead users will demonstrate stronger domain-specific innovativeness than more ordinary users. This seems particularly plausible as they are at the forefront of dominant market trends, are the first to experience leading-edge needs, and expect high benefits from new solutions. As a result, they will also demonstrate stronger product category involvement, which is reflected, for example, in heightened interest in new products (i.e., they will become aware of new technologies faster).

As noted above, some support for this link might be drawn from industrial lead-user studies (Urban and von Hippel 1988, Morrison, Roberts, and Midgley 2004). For consumer fields, some indirect support is provided by Franke and Shah (2003), Lüthje (2004), and Schreier and Prügler (2006), who studied various outdoor consumer product fields. The first authors report that user innovators – who tend to possess lead user characteristics – agree significantly more strongly than non-innovators with the statements “I usually find out about new products and solutions earlier than others” and “I have benefited significantly from the early adoption and use of new products”. The second author reports that user innovators – who again tend to possess lead user characteristics – more strongly

than non-innovators agree with the statement “I buy products immediately after market introduction”. In the third paper, the authors find a significant relationship between consumers’ leading-edge status and some adoption figures for certain product innovations. We thus hypothesize:

*H1: The higher a consumer’s leading-edge status, the stronger his/her domain-specific innovativeness will be.*

(2) *Lead users and perceived complexity of innovations.* The characteristics of an innovation generally affect the likelihood and speed of its diffusion (Gatignon and Robertson 1985, Rogers 1983). Upon studying consumer-packaged goods, Ostlund (1974), for example, concludes that “the perceptions of innovations by potential adopters can be very effective predictors of innovativeness, more so than personal characteristic variables” (p. 28). Similar findings are reported by Labay and Kinnear (1981), to name but one example. One such important characteristic is “perceived complexity”, which refers to the “degree to which an innovation is perceived as difficult to understand and use” (Ostlund 1974, p. 24; see also Rogers and Shoemaker 1971). The greater this characteristic is, the slower the rate of adoption will be (Gatignon and Robertson 1985, Ostlund 1974, Rogers 1983, Rogers and Shoemaker 1971).

Not all potential customers, of course, perceive the same levels of complexity at the same time. Leading-edge users by definition face unmet market needs and thus instantly search for solutions by, for example, heavily exposing themselves to messages about new products. As a result, lead users tend to possess a strong knowledge base in the underlying field related to technologies, materials, and products (Lüthje, Herstatt, and von Hippel 2005, Schreier and Prügl 2006, Tietz et al. 2005). They also demonstrate strong commitment to the field, reflected by high levels of use experience (Lüthje 2004, Schreier and Prügl 2006, Tietz et al. 2005). Consequently, lead users will be better prepared to develop a sound understanding of a new product’s functionality, and implementing it for personal use will require less (expected) learning effort. Therefore, lead users

will perceive a new innovation as less complex, and they will have less difficulty understanding its potential value (i.e., their leading-edge status will more readily allow them to make sound judgments about its likely performance). Thus:

*H2: The higher a consumer's leading-edge status, the lower the complexity s/he will perceive in innovations.*

(3) *Lead users and opinion leadership / opinion seeking.* It is common knowledge that consumers influence and are influenced by other consumers. For example, consumers actively seek advice for the purchase and use of products from peers, or they merely observe and imitate the purchase and consumption behavior of selected role models (cf. Turnbull and Meenaghan 2001). Conceptually, there are two general types of consumers in a given product domain: those who provide information for others (opinion leaders) and those who seek information from others (opinion seekers; Flynn, Goldsmith, and Eastman 1996). The first "species" has been particularly interesting to marketers, as they play an important role in the diffusion of innovations: They either encourage or discourage others from adopting new products (Rogers 1983).

Both constructs should be positively related to connectedness and communication proclivity, as these characteristics are prerequisites for allowing information to flow from one person to another (Flynn, Goldsmith, and Eastman 1994/1996, Rogers 1983, Gatignon and Robertson 1985). There might also be some overlap between opinion leaders and opinion seekers (i.e., complementary activities), as the former might also frequently seek information from certain others due to their involvement in the underlying product domain (Flynn, Goldsmith, and Eastman 1996). Both constructs are, however, theoretically distinct: There are seekers who are *not* leaders, and therefore the two constructs are theoretically predicted to be either uncorrelated or only weakly correlated (c.f. Flynn, Goldsmith, and Eastman 1996, who also provide empirical support for the constructs' discriminant validity). In line with this argument, we find individuals' opinion leadership and opinion seeking tendencies to be only moderately correlated in our data ( $r = -.13$ ).

We first propose that consumers' leading-edge status will be positively related to the construct of opinion leadership. In a nutshell, lead users will serve other users as role models, as they are ahead of the mass who seeks to follow their lead. This is backed by general studies on the characteristics of opinion leaders: They tend to be more competent and knowledgeable within certain topic areas (Katz 1957), more innovative (Childers 1986, Robertson 1971), more involved and more familiar with products (Chan and Misra 1990), and they tend to have more use experience and expertise (Childers 1986, Venkatraman 1989). As noted above, some empirical support is also available for this link: Morrison, Roberts, and Midgley (2000) report a significant relationship between libraries' leading-edge status and their opinion leadership. We thus hypothesize:

*H3: The higher a consumer's leading-edge status, the stronger his/her opinion leadership will be.*

Second, we argue that consumers' leading-edge status will be negatively related to the construct of opinion seeking. Due to their leading-edge status, lead users will be *less dependent* on others when considering a new product purchase. Note, however, that lead users might still seek a great deal of information primarily from other lead users in their community (Franke and Shah 2003). As opposed to less leading-edge users, however, lead users will generally demonstrate weaker opinion seeking tendencies. To put it differently, less experienced users will be *more dependent* on others' opinions and might therefore demonstrate higher levels of opinion seeking. They will do so because it might be more beneficial to them in order to reduce adoption-related risks (Assael 1987), to enable them to make more need-satisfying purchase decisions (Punj and Staelin 1983), to facilitate the purchase task as a whole (Flynn, Goldsmith, and Eastman 1996), and to help them adopt the values and beliefs of the group's leaders and accordingly place themselves within the social system (Katz and Lazarsfeld 1955, Flynn, Goldsmith, and Eastman 1996). Thus:

*H4: The stronger a consumer's leading-edge status, the weaker his/her opinion seeking will be.*

## 2. Study method

### 2.1 Overview, data collection and sample characteristics

The most critical aspect in a rigorous test of our hypotheses is the valid measurement of consumers' leading-edge status. We thus needed to identify a field where (a) the majority of users tend to evolve along the lines of a dominant market trend, and (b) where individual users are able to report their leading-edge status relative to other users. This seems particularly feasible when an individual's trend position might be measured by some type of objective performance indicators. As we found that extreme sports communities fit these prerequisites well, we chose to collect data from (1) kite surfers and (2) technical divers. We address issues of generalizability in our discussion.

(1) First, we test Hypotheses 1 and 2 in the field of kite surfing by revisiting the sample collected by Franke, von Hippel, and Schreier (2006), which consisted of several European kite surfing communities. Kite surfing is a relatively young but rapidly growing sport in which people use a kite to pull a surfboard along the water, using the power of the kite to jump several meters into the air. The major trend in this sport is a continuous advancement in performance over time. This performance is reflected by increasingly radical jumps – in terms of height above water, length of time in air, and the degree of difficulty of tricks (Franke, von Hippel, and Schreier 2006).

Our questionnaire was sent via e-mail to 403 kite surfers, and a reminder e-mail was sent out after one week. We received 139 completed responses (corresponding to a response rate of 34.5%). As a series of t-tests revealed neither systematic nor significant differences between early and late respondents (Armstrong and Overton 1977), we conclude that there seem to be no serious concerns related to effects of response delay. On average, respondents are 30 years old ( $SD = 1.74$ ) and predominantly male (92.0%), started kite surfing three years ago ( $SD = 1.74$ ), and practice the sport 63 days per year ( $SD = 65.02$ ).

(2) Second, we test Hypotheses 3 and 4 in the field of technical diving – a significant submarket of the overall diving domain. Technical diving refers to diving with a "ceiling" which prohibits a direct

ascent to the surface. This ceiling can either be a mandatory stop (due to decompression requirements when diving at greater depths) or some type of physical barrier (diving in cave systems or inside shipwrecks). The entire field tends to evolve along the latent and dominant trend of spending ever-longer periods of time in increasingly complex and difficult environments. This includes, for example, extended dives in unexplored and more complicated terrains (e.g., wrecks and caves which are difficult to access), which results in an increased amount of time necessary to return to the surface. Trend identification was strongly guided by secondary data analysis (e.g., magazines and websites) as well as various expert discussions (e.g., with avid users, community webmasters, and equipment manufacturers). We collected data from the most significant international tech diving community worldwide – “Global Underwater Explorers” ([www.gue.com](http://www.gue.com)).

The questionnaire was sent via e-mail to all members with the support of community founder Jarrod Jablonski (plus a reminder e-mail after one week). A total of 193 tech divers completed the questionnaire, indicating a satisfactory response rate of 20.2% (based on the 957 members reached by e-mail). Again, there are no concerns regarding effects of response delay, as a series of t-tests indicated neither systematic nor significant differences between early and late respondents. On average, respondents are 36 years old ( $SD = 8.05$ ), again predominantly male (94.3%), have logged an average of 48.45 dives ( $SD = 67.04$ ) over the last twelve months, and their average total number of logged dives comes to 303.27 ( $SD = 519.07$ ).

## *2.2 Measurement*

All constructs in this study were operationalized using existing scales from the literature. Items were originally created as reflective (as opposed to formative) indicators of the underlying latent construct (i.e., they are assumed not to cause but *to be caused by* the latent variable; thus, items must be correlated and are theoretically interchangeable; see Churchill 1979, Diamantopoulos and Winklhofer 2001 for more details). We consistently employ reflective (as opposed to formative) scale purification procedures (e.g., Anderson and Gerbing 1988, Churchill 1979).

*Kite surfing sample.* The leading-edge status of a consumer is measured using five items (adapted from Franke, von Hippel, and Schreier 2006), which led to a satisfactory alpha of 0.77. A sample item reads “I have already had problems with my equipment that could not be solved with the manufacturer’s conventional offerings” (all measurement items are listed in Table 1). Confirmatory factor analysis (CFA) was employed to assess measurement quality and showed a good overall fit (GFI = 0.94; IFI = 0.94; CFI = 0.93). All indicators loaded positively and significantly on leading-edge status ( $p$  values  $< 0.01$ ), which confirms a sound level of convergent validity.

For domain-specific innovativeness, we adapted the established six-item scale developed by Goldsmith and Hofacker (1991). A sample item reads “In general, I am among the last in my circle of friends to buy new kite surfing equipment when it appears” (see Table 1). Cronbach’s alpha was initially below the recommended 0.7 threshold (0.60) but could be improved to 0.65 by eliminating one item which had a low corrected item-to-total correlation (0.15). CFA for the remaining items delivered satisfactory overall fit indices (GFI = 0.98; IFI = 0.96; CFI = 0.95). All indicators loaded positively on domain-specific innovativeness ( $p$  values  $< 0.05$ ).

Perceived complexity is measured with regard to the “bow kite” technology, which was introduced on the market only a few months before our survey. Expert discussions prompted us to choose this object as it is not only new but also highly relevant to the entire industry. Experts also pointed to the fact that the bow kite might be perceived as somewhat ambivalent as regards the technology’s “real” benefit to kite surfing. As a result, from a consumer's perspective it also appears to be fairly difficult to understand and evaluate (in terms of functionality and benefits). We employed three items (alpha = 0.72) which we adapted from Eliashberg and Robertson (1988) and Atuahene-Gima (1995) (see Table 1). One sample item reads, “The product concept of the bow kite is difficult for me to evaluate and understand”. For this construct, CFA also delivered satisfactory measurement

results: Fit indices are high (GFI = 1.00; IFI = 1.00; CFI = 1.00), the indicators' factor loadings are all positive (p values < 0.01).

We also added two open-ended questions to gain some qualitative insight into kite surfers' technical and usage-related knowledge of the bow kite ("Finally, could you please explain in a few words (a) how the bow kite works and (b) what the major benefits of this concept are in your opinion [for your kite surfing]"). Answers to the open-ended questions were coded by two independent kite experts who assigned between one and three points for both parts of this exercise (1 = respondent does not know a lot about the bow kite, 2 = respondent has a fairly good understanding of how the bow kite works, and 3 = respondent's knowledge related to the bow kite is excellent; intercoder agreement was 78%; the maximum distance between coders' judgments was 1). Codes were averaged for further analyses. Note that the results reported in the next section also remain robust when only cases with 100% agreement are included.

*Tech diving sample.* Consumers' leading-edge status is measured by seven items which yielded an alpha of 0.71 (see Table 1). One sample item reads, "I have needs related to tech diving which are not covered by the products currently offered on the market". CFA initially showed inadequate fit. A closer inspection revealed that fit could be improved if two items' error terms were allowed to co-vary. As this cannot be justified on an *a priori* basis (Anderson and Gerbing 1988), we decided instead to eliminate them from further analysis (alpha for the reduced scale: 0.75). CFA for the remaining items delivered excellent results (GFI = 0.99; IFI = 1.00; CFI = 1.00; all indicators loaded positively on leading-edge status; p values < 0.01).

Items for opinion leadership and opinion seeking were adapted from Flynn, Goldsmith, and Eastman (1996), who report good psychometric properties for both scales. Opinion leadership is measured using six items (see Table 1). One sample item reads, "I often persuade others to buy the tech diving equipment that I like". The scale yielded an alpha of 0.83. CFA initially showed inadequate fit. As with leading-edge status, fit could be improved if one item's error term were

allowed to co-vary with another item's error term. We again refused to do so and instead eliminated it from further analysis. A new CFA showed satisfactory results (GFI = 0.94; IFI = 0.93; CFI = 0.93; all indicators loaded positively on opinion leadership;  $p$  values < 0.01). The reduced scale yielded an alpha of 0.79. Opinion seeking is also measured using six items (see Table 1) which led to an alpha of 0.86 (e.g., "I like to get others' opinions before I buy tech diving equipment"). The results of CFA indicate good fit (GFI = 0.95; IFI = 0.96; CFI = 0.96) and a sound degree of convergent validity (factor loadings are positive and significant;  $p$  values < 0.01).

Insert Table 1 about here

### 3. Findings

As described above, we test Hypotheses 1 and 2 among kite surfers and Hypotheses 3 and 4 among tech divers. To examine the hypothesized links between the constructs, the coefficients of the confirmatory measurement model and the structural model are estimated simultaneously (Anderson and Gerbing 1988). Overall, the fit statistics of the models are satisfactory throughout (see Figure 1).

In line with Hypothesis 1, we first find that consumers' leading-edge status is positively and significantly related to domain-specific innovativeness ( $\beta = 0.39$ ;  $p = 0.000$ , see Figure 1). Leading-edge kite surfers thus generally tend to be more innovative with respect to the adoption of new kite surfing products than more ordinary users.

Second, we find confirmation for Hypothesis 2 that consumers' leading-edge status is significantly related to the perceived complexity of new products ( $\beta = -0.43$ ;  $p = 0.000$ ). Leading-edge kite surfers tend to have a better understanding of the functionality of the newly introduced concept of the bow kite and indicate that implementing it for personal use would require less learning effort. For lead users, the bow kite thus seems to be significantly less "complex". These findings are supported by the open-ended questions: The higher one's leading-edge status, the better one's

technical knowledge of the bow kite's functionality ( $r = 0.16$ ;  $p = 0.044$ ) and the better the perception of the bow kite's benefit to one's kite surfing ( $r = 0.17$ ;  $p = 0.038$ ). Interestingly, we also find that a number of users not only "correctly" addressed the benefits as originally intended and marketed by the manufacturers of the bow kite (more safety due to better depowering possibilities, one size fits all wind ranges). They also found a completely new benefit or application of the concept, namely that of using the bow kite to surf waves efficiently (which used to be quite difficult with older equipment). Those users who pointed out this new application ( $n=16$ ) demonstrate a significantly higher level of leading-edge status (mean = 2.03; SD = 0.53) than the remaining users in our sample (mean = 1.29; SD = 0.81;  $p < 0.001$ ).

Third – and consistent with Hypothesis 3 – we find that consumers' leading-edge status is positively and significantly related to opinion leadership ( $\beta = 0.29$ ;  $p = 0.009$ ). Leading-edge tech divers thus tend to serve as opinion leaders in the field. Fourth, we find confirmation for Hypothesis 4 that consumers' leading-edge status is negatively and significantly related to opinion seeking ( $\beta = -0.33$ ;  $p = 0.000$ ). The degree to which tech divers seek product-related information from peers thus decreases with their leading-edge status.

Insert Figure 1 about here

#### **4. Discussion**

In the course of two studies of extreme sports communities, we provide initial evidence that the lead user construct might be highly valuable to B2C companies beyond the fuzzy front end of new product development. We find that consumers' leading-edge status is significantly related to domain-specific innovativeness, suggesting that lead users in a given field tend to be early and heavy adopters of new products. We also find that lead users tend to perceive new products as "less complex" than more ordinary users, thus shedding some initial light on the question of why lead users might be better *prepared* to adopt new products. In addition, we find that the lead user

construct might also be relevant to the diffusion of new products: The higher a consumer's leading-edge status, (a) the higher his/her opinion leadership and (b) the lower his/her opinion seeking will be. In this section, we first discuss some practical implications of our findings and then conclude by addressing the study's limitations and issues for future research.

#### *4.1 Managerial implications*

Given the significant link between lead users and domain-specific innovativeness, we suggest that marketers might employ leading-edge status as a highly tangible and effective variable to position new products upon market introduction. This idea is reinforced by our finding that lead users perceive new technologies as less complex. As a result, they will be more ready to adopt new products than less leading-edge users, *ceteris paribus*. In order to increase the chances of adoption, companies might also integrate lead users into later pre-launch stages of product development such as concept and prototype testing phases (to ensure that the new product clearly delivers a comparative advantage). After launch, lead users might be tapped for modification and improvement ideas (Urban and von Hippel 1988). As highlighted by our qualitative findings on the bow kite, lead users might also point out valuable new applications not foreseen by the manufacturer.

Lead users might, however, not only be relevant to new product management because of their role as early adopters but also because of their role as opinion leaders. Based on our findings, we thus suggest that companies should systematically target lead users to help speed up the diffusion process of new products. This tactic might be particularly promising for the marketing of radical innovations where companies need to establish and educate the market (Atuahene-Gima 1995). Although not addressed in our study, it seems plausible that less experienced users systematically seek opinions on new products from users who are more leading-edge (by interacting with them directly or merely by observing how they perform with new equipment). If lead users are satisfied

with the new products they adopt, they might provide vivid arguments for the broader mass to follow.

All these implications raise the question of the incremental value of positioning new products to attract lead users as opposed to the traditional “first target group”, namely early adopters (strictly speaking: innovators and early adopters) (Goldsmith and Hofacker 1991, Goldsmith and Flynn 1992, Roehrich 2004, Rogers 1983).

Although there are some obvious overlaps between the two types (both generally tend to adopt new products faster and more intensively), we argue that there are some managerially relevant differences. Overall, lead users might represent a richer and more comprehensive source for new product management than early adopters.

Most importantly (and in contrast to early adopters), lead users are ahead of an important marketplace trend and thus face needs today which will not hit the overall market until tomorrow (von Hippel 1986). This characteristic makes them conceptually distinct from “ordinary” early adopters and can provide marketers with rich insight into untapped market needs and ideas for new products. If a new product successfully addresses (some of) those needs, lead users will become early adopters. In contrast, to a certain degree the reasons why early adopters tend to buy new products faster than others have been found to be independent of the *specific* needs a new product aims to fulfill (this is mostly explained by personal factors like the need for stimulation or the need for uniqueness, Roehrich 2004; see also Goldsmith and Flynn 1992 for a review on early adopters’ personal characteristics). Early adopters thus hardly provide concrete directions for new product development, and as their needs might be more varied and less clear than those of lead users, it also appears more difficult to market new products to them successfully.

As the basic tenet of lead user theory posits that the needs experienced by lead users will hit broader parts of the market later on (von Hippel 1986), products positioned to meet those needs might

almost “automatically” continue to diffuse to the followers of lead users. Note that lead users – in the same way as early adopters (c.f. Turnbull and Meenaghan 2001) – can influence later adopters through social display (creating awareness and knowledge) and legitimation (providing security about purchasing a new product) (Turnbull and Meenaghan 2001). Lead users might, however, additionally serve as strong role models because of their use experience and performance related to leading-edge needs. Ordinary kite surfers, for example, will strongly emulate leading-edge kite surfers performing new aerial tricks. It appears highly plausible that this casts a more favorable light on lead users and their equipment than on ordinary early adopters who are less leading-edge.

In sum, there appear to be strong arguments that lead users might provide additional value over early adopters in the marketing of new products.

#### *4.2 Limitations and future research*

In order to take our tenets down the road of empirical validation, we most importantly needed to identify a field which tends to evolve along the lines of a dominant market trend and where a user’s trend position can be measured in a valid way. Therefore, we primarily had to stress issues of internal validity (Calder, Phillips, and Tybout 1981). As for the external validity of our findings, one might argue that both domains studied appear to be very unique, thus questioning generalizability beyond these extreme sports communities.

This seems to be true with regard to the specific intended usage (e.g., using a power kite to surf on the water) as well as the specific dominant trend (e.g., performing more radical jumps). However, we argue that the underlying mechanism seems very similar to any other consumer field. The same arguments as to why leading-edge kite surfers, for example, might serve as opinion leaders in their field can be brought forward for computer gamers, mountaineers, or the like – as long as there is a common trend and users are able to recognize and appreciate the relative trend position of others. Nonetheless, we encourage future research to extend our findings empirically to include a diverse set of consumer domains.

In order to shed some light on the question of why lead users might be better prepared to adopt new products faster than more ordinary users, we focused exclusively on perceived complexity.

However, the relevant literature suggests that there are a number of other relevant perceived innovation attributes such as compatibility or perceived risk (e.g., Rogers and Shoemaker 1971).

Future research might extend our findings by analyzing whether lead users also perceive new technologies differently in relation to these characteristics.

In addition, future research might also extend our findings on the link between leading-edge status and opinion leadership and opinion seeking. We measured these constructs using general self-reporting scales (Flynn, Goldsmith, and Eastman 1996). As a result, we only know that leading-edge status is generally related to opinion leadership and opinion seeking. We do not know, however, *for whom* lead users serve as opinion leaders, nor do we know whom the less leading-edge users actively seek out for advice. As outlined above, we hypothesize that leading-edge status might be a promising variable to guide users in seeking out the appropriate users for credible product and usage information. Sociometric methods (asking respondents about the persons from whom they seek advice) or the use of key informants to indicate who the most important opinion leaders are would help in this regard (Morrison, Roberts, and Midgley 2000).

Finally, the above-mentioned practical implications of our findings (e.g., employing the lead user construct as a variable to position new products) might serve as a basis for further empirical investigations. This might help us gain a more in-depth understanding of how lead users might improve the design and marketing of new products.

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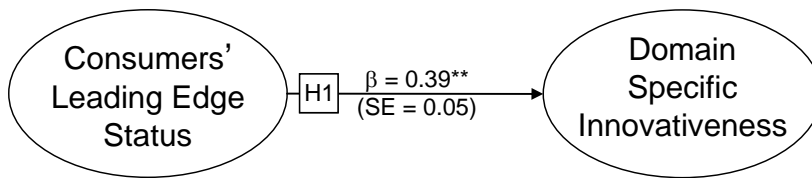
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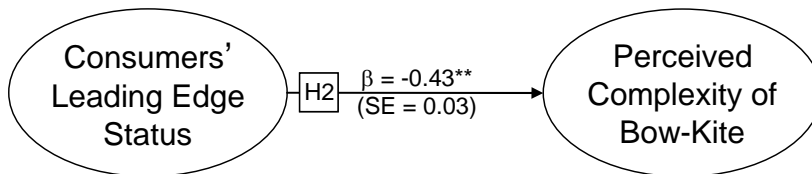
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FIGURE 1

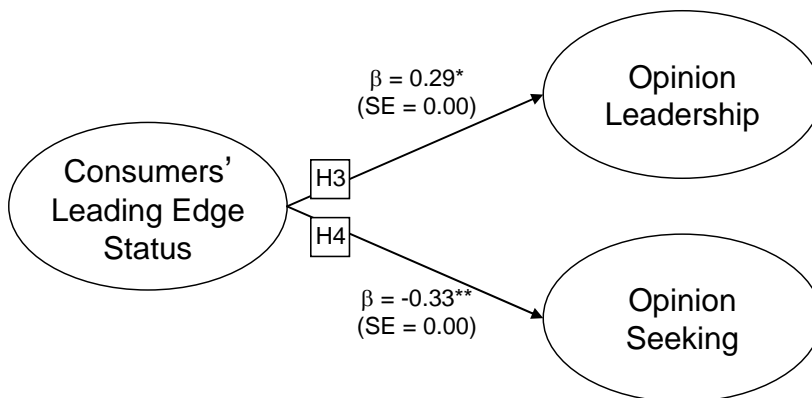
Overview of results



Kite surfing sample (n=145); Squared Multiple Correlation (SMC) = 0.15  
 Fit statistics:  $\chi^2/df = 2.04$  (69.23/34); Goodness of Fit Index (GFI) = 0.92;  
 Incremental Fit Index (IFI) = 0.92; Comparative Fit Index (CFI) = 0.92



Kite surfing sample (n=143); SMC = 0.19  
 Fit statistics:  $\chi^2/df = 2.68$  (50.96/19); GFI = 0.92; IFI = 0.93; CFI = 0.92



Tech diving sample (n=193); SMC (H3) = 0.08; SMC (H4) = 0.11  
 Fit statistics:  $\chi^2/df = 1.72$  (175.34/102); GFI = 0.90; IFI = 0.94; CFI = 0.93

\*  $p < 0.010$  (2-sided)  
 \*\*  $p < 0.001$  (2-sided)

TABLE 1

Measurement items

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**A) Kite surfing sample**

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*1) Consumers' leading-edge status*

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- I am dissatisfied with some pieces of commercially available equipment.<sup>a</sup>
- I have already had problems with my equipment that could not be solved with the manufacturer's conventional offerings.<sup>a</sup>
- Please estimate your maximum hang time when kite surfing (the longest time you spend in the air when jumping).<sup>b</sup>
- Now please estimate how high you go when you jump.<sup>c</sup>
- How well can you jump when kite surfing? Please rate your ability according to the scale below.<sup>d</sup>

*2) Domain-specific innovativeness*

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- In general, I am among the last in my circle of friends to buy new kite surfing equipment when it comes out.<sup>e</sup>
- If I heard that new kite surfing equipment was available at the store, I would not be interested enough to buy it.<sup>e</sup>
- Compared to my friends, I own few pieces of kite surfing equipment.<sup>e</sup>
- In general, I am the last in my circle of friends to know about the latest kite surfing equipment.<sup>e</sup>
- I am willing to buy new kite surfing equipment even if I haven't tried it yet.<sup>e (r)</sup>
- I do not know the names of new kite surfing brands before other people do.<sup>e</sup>

*3) Perceived complexity*

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- Getting used to a bow kite would require major learning effort on my part.<sup>a</sup>
- Getting used to a bow kite would take a long time before I could fully understand the advantages.<sup>a</sup>
- The product concept of the bow kite is difficult for me to evaluate and understand.<sup>a</sup>

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**B) Tech diving sample**

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*1) Consumers' leading-edge status*

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- While tech diving, I am often confronted with problems which cannot be solved by the tech diving equipment available on the market.<sup>a</sup>
- I have needs related to tech diving which are not covered by the products currently offered on the market.<sup>a</sup>
- Compared to most other tech divers, I do more sophisticated and difficult dives.<sup>a</sup>
- What is the maximum diving depth you have reached to date?<sup>c</sup>
- What was your maximum diving time?<sup>f</sup>
- How long was your maximum decompression time?<sup>f</sup>
- The maximum time I have spent in a wreck/cave to date is:<sup>f</sup>

## *2) Opinion leadership*

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- My opinion on tech diving equipment does not seem to count with other people.<sup>a</sup> (r)
- When they choose tech diving equipment, other people do not turn to me for advice.<sup>a</sup> (r)
- Other people rarely come to me for advice about choosing tech diving equipment.<sup>a</sup> (r)
- People I know pick tech diving equipment based on what I have told them.<sup>a</sup>
- I often persuade others to buy the tech diving equipment that I like.<sup>a</sup>
- I often influence people's opinions about tech diving equipment.<sup>a</sup>

## *3) Opinion seeking*

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- When I consider buying tech diving equipment, I ask other people for advice.<sup>a</sup>
- I don't like to talk to others before I buy tech diving equipment.<sup>a</sup> (r)
- I rarely ask other people what tech diving equipment to buy.<sup>a</sup> (r)
- I like to get others' opinions before I buy tech diving equipment.<sup>a</sup>
- I feel more comfortable buying tech diving equipment when I have gotten other people's opinions on it.<sup>a</sup>
- When choosing tech diving equipment, other people's opinions are not important to me.<sup>a</sup> (r)

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<sup>a</sup> Measured on 5-point scales (where 1=strongly disagree and 5=strongly agree)

<sup>b</sup> Open-ended question (in seconds)

<sup>c</sup> Open-ended question (in meters; vertical distance)

<sup>d</sup> Freestyle mastery scale (where 0=no jumps and 10=high-level jumps)

<sup>e</sup> Measured on 5-point scales (where 1=strongly agree and 5=strongly disagree)

<sup>f</sup> Open-ended question (in minutes)