

Lüthje, Christian

Working Paper

Characteristics of innovating users in a consumer goods field: An empirical study of sport-related product consumers

Working Paper, No. 8

Provided in Cooperation with:

Hamburg University of Technology (TUHH), Institute for Technology and Innovation Management

Suggested Citation: Lüthje, Christian (2000) : Characteristics of innovating users in a consumer goods field: An empirical study of sport-related product consumers, Working Paper, No. 8, Hamburg University of Technology (TUHH), Institute for Technology and Innovation Management (TIM), Hamburg, <https://nbn-resolving.de/urn:nbn:de:gbv:830-opus-1556>

This Version is available at:

<https://hdl.handle.net/10419/55456>

Standard-Nutzungsbedingungen:

Die Dokumente auf EconStor dürfen zu eigenen wissenschaftlichen Zwecken und zum Privatgebrauch gespeichert und kopiert werden.

Sie dürfen die Dokumente nicht für öffentliche oder kommerzielle Zwecke vervielfältigen, öffentlich ausstellen, öffentlich zugänglich machen, vertreiben oder anderweitig nutzen.

Sofern die Verfasser die Dokumente unter Open-Content-Lizenzen (insbesondere CC-Lizenzen) zur Verfügung gestellt haben sollten, gelten abweichend von diesen Nutzungsbedingungen die in der dort genannten Lizenz gewährten Nutzungsrechte.

Terms of use:

Documents in EconStor may be saved and copied for your personal and scholarly purposes.

You are not to copy documents for public or commercial purposes, to exhibit the documents publicly, to make them publicly available on the internet, or to distribute or otherwise use the documents in public.

If the documents have been made available under an Open Content Licence (especially Creative Commons Licences), you may exercise further usage rights as specified in the indicated licence.

**Characteristics of innovating users
in a consumer goods field**

An empirical study of sport-related product consumers

Dr. Christian Lüthje

Oktober 2000
Arbeitspapier Nr. 8

Abstract

We report on a survey of the innovation activities and characteristics of 153 users of outdoor-related consumer products. We find a high level of innovation by these consumers. Thirty-seven percent report that they have developed ideas for new or improved products, and more than 9% report building product prototypes or even marketable products. We also find that innovating users can be reliably distinguished from non-innovating ones by characteristics such as the benefit they expect from using their innovations and the level of expertise they have in their sport.

Taken together, these two findings - frequent innovation by consumers and the possibility to identify efficiently those who innovate – imply that innovation by users can be an important source of new product ideas for consumer goods companies. Effective utilization of this resource will require significant changes in idea generation methodologies for many consumer good firms.

1 Introduction

Empirical research in a number of fields has shown that users frequently play an important role in the development of new products. A big fraction of the explored innovations is at least directly initiated by requests and concrete needs of users (Biemans 1991; Utterback et al. 1976; Mansfield 1988). But not only the initiative, also the idea or the concept for innovations often stems from the side of the user (Voss 1985; Baker et al. 1986). Furthermore, several studies could even show that the users also dominate the subsequent stages of the development process. They are frequently the first to develop and use prototype versions of what later become commercially significant new industrial products (Enos 1962; Knight 1963; Freeman 1968; Lionetta 1977; von Hippel 1976, 1977, 1988; VanderWerf 1990; Shaw 1985).

Motivated by these findings, producers of industrial goods are beginning to learn to systematically seek out user-developed innovations as a source of ideas and prototypes for new commercial products (von Hippel et al. 1999). Early empirical results show that at least one producer – 3M Corporation - is reaping higher sales and profits from this course of action than from the idea generation methods it has traditionally employed (Lilien et al 2000).

We think that it may be possible to replicate this emerging new strategy for idea generation in the field of consumer products and services. However, the existing research focuses on technology driven innovations for industrial goods. For consumer goods, systematic evidence as to whether users are a significant source of innovation is only just beginning to be developed. Thus, while there are a number of documented cases of end users being the developers of significant consumer goods innovations there is only one systematic exploration of the importance of user innovation within a single category of end user products over time (Shah 2000).

The lack of theoretical work and empirical studies in the field of innovative consumers leads to two research questions which are the focus of this survey: Firstly, there is a lack of understanding concerning the empirical relevance of innovation activities by users in consumer markets. Therefore, we ask whether innovating consumers exist and to what extent they undertake innovation efforts. Secondly, it is widely unexplored whether specific user characteristics

discriminate between innovating and non-innovating users. Consequently, in this paper a comparison between these two user groups is conducted in order to identify personal factors that explain why some users innovate and others remain passive.

We begin in section 2.1 with a review of relevant findings concerning the role of consumers in the development of innovations. Next, we compile a set of possible characteristics of innovating consumers based on both research findings and anecdotal evidence (section 2.2). In section 3 we outline our research methods. The findings are presented in section 4. In the final section, we discuss the implications of the findings for the market research in the front end of innovations.

2 Review of the literature

2.1 The role of consumers in the development of commercialized innovations

A number of cases of consumer innovations are documented. Particularly in the field of leisure time activities several of the commercially successful new products were developed by the users of these goods. The user inventions range from granola bars, sports drinks, mountain bikes, video games, photography equipment to bakery products (von Hippel 1982; 1986; 1999).¹

Besides these anecdotal cases there are three empirical studies dealing with the importance of innovative end-user activities. Lawton/Parasuraman (1980) in a comparative exploration of several consumer markets showed that users stimulated 12.7% of the innovation processes. A higher level of consumer activities was found by Utterback et al. (1976) for consumer electronics. 32.1% of the analyzed manufacturer innovations were initiated by detailed user requests. Only one empirical study analyzes the development of user-innovations within a single product category over time. As we mentioned before, Shah (2000) recently explored the sources of innovation for equipment used in recently-developed sports – snowboarding, skateboarding and windsurfing. She found that end users were always the developers of the first versions of

¹ For instance, the URL "www.ideo.ch" contains a rich fund of inventions for consumer products. Some of these inventions were developed by end users, e.g. an easy handling fire extinguisher (no. FB9218) and a small stove for outdoor activities (no. FB9198).

the basic equipment in each of these fields. She also found that 58% of the major improvements to this equipment were developed by „lead users“ and „user-manufacturers.“²

Whereas there is at least some empirical evidence regarding the fractions of innovations that can be to some degree attributed to **industrial** users, no empirical findings exist concerning the frequency of innovating **consumers** among a user population.

Study	Innovation area	Users sampled (n)	% of users who developed innovations for own use
Morrison/ Roberts/ von Hippel (1999), p. 6	Library information search system OPAC (Australia)	102	18%
Herstatt/ von Hippel (1992), p. 216	Pipe hangers hardware (Switzerland)	74	36%
Urban/ von Hippel (1988), p. 573	PC-CAD for the design of printed circuit boards (USA)	136	23%

Table 1: Fraction of innovating uses within user populations

Again, the only three studies that show data on this issue, Morrison et al. (2000) in the field of OPAC information search systems, Herstatt/von Hippel (1992) for pipe hanging systems and Urban/von Hippel (1988) for PC-CAD, are not focused on consumer markets. All the three studies indicate that a considerable part of the user sample (18% of the OPAC users, 36% pipe hanger hardware users and 23% of the PC-CAD users) has innovated in some way.³ The question arises whether similar rates of innovating users can also be found in populations of end-users.

2.2 Characteristics of innovating consumers

A number of variables concerning motivational pre-dispositions, skills and knowledge of the users have been shown to be related to the likelihood of innovation. A good case can be made for additional variables on logical grounds. We list and briefly describe both in this section.

²„Lead users“ are defined as firms or individuals who (1) have needs that foreshadow general marketplace demand, and (2) expect high benefits from obtaining a solution to their needs (von Hippel 1986). „User-manufacturers“ are one or a group of lead users who benefited both from the use of the innovation and from participation in a small lifestyle firm which produce and sell the innovation to others.

Expectation of innovation related benefits

It is established that the rate of innovation is affected by expectations of innovation-related benefit (Mansfield 1968; Schmookler 1972). For several product categories it was shown that the greater the benefit a user expects from a novel product, the greater his willingness to devote resources to obtain a new solution (e.g. von Hippel 1988, Riggs/von Hippel 1994, Morrison et al. 2000). The bell-shaped diffusion curves for new products and services show that not all individuals within a user population expect a high benefit from innovations at the same time (Dosi 1991, Rogers 1995). Often it takes several years for a complete diffusion of high benefit expectations. Therefore, the question arises: what kind of users expect a high benefit from an innovation earlier than others.?

Prior research into innovation by “lead users” indicates that high benefit expectations are often connected to the experience of **new needs** that are not addressed by existing market offers. Lead users, by definition, face new needs earlier than the bulk of the marketplace. Under this condition the user can benefit from developing an innovative solution, whereas the manufacturers may see only a small market potential for new products so that they decide not to innovate. In fact, it was often proved that seeking for users with new and unfulfilled needs turned out to be a promising strategy to identify innovating users (Urban/von Hippel 1988, Herstatt/von Hippel 1992). An indirect measure logically associated with the feeling of new needs is users’ **dissatisfaction with existing products**. Dissatisfaction while using existing products or services can be the trigger to the new awareness of the new needs and to see which products have to be improved in order to fulfill the new needs (Teubal 1979). This measure for benefit expectations was used successfully by Urban/von Hippel (1988) and Lüthje (2000) in the search for innovating users.

Users may expect to profit not only from the use of their innovations but also hope to be **financially rewarded** for their creative work. The importance of financial rewards for the performance of human beings is indisputable. Financial motivators play a central role in motivational models in social and organizational psychology (Herzberg et al. 1967, Lawler

³ Furthermore, Morrison et al. (2000) found that manufacturers of OPAC systems rate many of the user modifications as inventions of high novelty and importance.

1971). Innovating users could expect a voluntary payment by the manufacturers and even could decide to license or to market their invention. Shah (2000) showed that a big fraction of user innovations in the field of windsurfing, snowboarding and skateboarding were developed by so called "user-manufacturers". These lead users benefited both from use and from participation in a small "lifestyle firm" which produced and sold innovative equipment for their sport.

In addition, innovation benefit is not necessarily exclusively related with the outcome of user inventions. Innovating consumers should also profit from the innovating process itself. Users could have **fun in solving problems** during the development process. They have the chance to exploit their abilities and know-how and by this gain satisfaction. This argumentation is based on motivational psychology, specifically on the Human Resources Approach (Bolman/Deal 1984).

Level of user expertise

Motivation, caused by benefit expectations, should not be sufficient to explain user innovation activities. The performance of individuals is at the same time influenced by the motivation and the ability (Vroom 1967; Lawler III 1977). Therefore, the level of user expertise in a given product field may be positively associated with the likelihood of user inventions. Users with more expertise regarding that product type should have correspondingly lower innovation-related costs and so be more likely to innovate, other things being equal.

User expertise in a given category can be divided into "use experience" and "product related knowledge". **Use experience** emerges via the frequent use of products. Like in all creative problem solving processes, use experience is needed to systematically analyze the existing problems, to conceive solutions and to test them in practice (Weisberg 1986; Stein 1989). **Product related knowledge** consists of know-how about the product architecture and the used materials and technologies of the existing products in the market. Users need this understanding if they want to translate their needs and demands, which are formulated in the language of the customer, into concrete (technical) product and service specifications in the language of engineers.

In this chapter we have made assumptions about user characteristics enhancing the motivation and qualification of consumers to take part in innovation activities. These

propositions are to be explored in the next chapter via a customer survey within a consumer market. The findings should help manufacturers to identify innovative users in order to incorporate their creative input into market research in the early stages of new product developments.

3 Research Methodology

3.1 Empirical field

The empirical field of this survey is the user population of outdoor products in Germany. Outdoor sports can be defined as "a complex of human activities performed in milieu of nature through their own strength (...)" (Neuman, 1994). We focused on the four sports activities most cited in outdoor-related journals: climbing/mountaineering, hiking, cross-country skiing and mountain -biking. The manufacturers in the outdoor industry produce clothing, equipment and sports apparatus for these four outside activities (e.g. climbing shoes, stoves, canoes). Outdoor consumers by definition are end users who buy and/or use these products.

The choice of the outdoor-industry as the empirical field is based on the assumption that numerous users are highly motivated and qualified for innovation. Outdoor-products meet all preconditions for high involvement so that a high user motivation by **expected benefits** seems likely.⁴ In addition, outdoor-users are often members of clubs.⁵ It is asserted, that club members carry out their sports more intensively and that they exchange more information with other sportsmen than their not-organized counterparts. Therefore, they should have a high level of **use experience**. Finally, most of the outdoor products have a technological complexity that users can cope with. This enhances the probability that a subset of outdoor customers gain sufficient **product related knowledge** to invent improved or new products.

⁴ The three main preconditions are: 1. perceived importance of the product; 2. hedonic value of the product class; 3. perceived sign value of the product class; Laurent/Kapferer (1985), pp. 44-45.

⁵ For instance the German-Alps-Club (Deutscher Alpenverein) –the most important outdoor related club in Germany- has more than 610,000 members (state: 98/12).

In order to review the suitability of this product category a pilot study was conducted. We contacted outdoor-manufacturers and identified five appropriate key informants who were responsible for the user-manufacturer-communication in their firms.⁶

The target population of this survey consisted of all persons in Germany, that are active in at least one of the listed outdoor-sports and can therefor be classified as an outdoor-user. For this population no exhaustive list exists for random sampling. Therefor, the survey focused on customers who order their products directly from the manufacturer and are consequently recorded in the database of the firms.⁷

Five companies were randomly selected from a list of manufacturers of outdoor products in Germany.⁸ The goal was to include all the ordering users of these five firms into the survey. This selection procedure is known as cluster sampling. Unfortunately, only two of the five manufacturers could be convinced to put a complete list of their ordering users to the disposal of the researchers. With this small number of companies it can not be excluded that distinctive characteristics of the manufacturers influence the findings. Consequently the representativeness of the results is diminished.⁹

The sampling frame of this study consisted of 620 ordering customers of two manufacturers in the outdoor industry.

⁶ The firms were SALEWA Deutschland, Fjällräven GmbH, Ortovox GmbH, Lowa Sportschuhe GmbH and Fährmann-Konzept-GmbH.

⁷ By this, the selected user population (ordering users) is smaller than the original target population (all outdoor-users). This fact is termed as "undecoverage". It could be asserted that ordering-customers differ from outdoor-users who purchase the products at the point of sales. The two user groups obviously differ in their purchasing behavior. They show preferences for certain distribution channels. However, no plausible reason could be found why this difference should have an impact on the variables which are explored in this study (e.g. user experience, new need). However, the focus on ordering-users is to be taken into account in the interpretation of the findings.

⁸ A list of 108 companies was put together using different sources (firm register of the German Industry And Trade Association IHK and catalogues of outdoor fares).

⁹ A statistical comparison of the findings between the customers of the two manufacturers does not lead to significant differences. Only two of the 99 variables explored in the questionnaire showed a difference significant on the 5%-level. The rating scaled variables were checked via a two-side t-test. The variables measured by nominal or ordinal scales were compared by the chi-square-test (Pearson) or the Fisher-Yates-exact-test.

3.2 Data collection

A written questionnaire was used for data collection. After a pre-test with a pilot sample of 25 outdoor-users,¹⁰ the questionnaire was sent to the 620 users of the sample. 609 questionnaires reached the addressee (see table 2). Three weeks after the first mailing a follow-up was sent to those users who had not yet replied. After this second mailing 158 completed questionnaires were sent back (return rate: 25.9%). This rate is high relative to other studies with end users in consumer markets. Five responses were not usable and had to be excluded from the analysis. Finally, 153 questionnaires were included into the survey.

	n	%
Addressed users	620	
Reachable users	609	100%
Returned questionnaires	158	25.9%
Usable questionnaires	153	25.1%

Table 2: Questionnaire response

4 Findings on innovating consumers in the outdoor-industry

4.1 Consumers' innovation efforts

In this chapter we explore whether respondents of the survey undertake innovation efforts in order to develop ideas, concepts and prototypes for new products.

More than one third of the customers (37.3%) generated at least one idea for improved or new outdoor-related products (figure 1). It can be claimed, that not only in industrial markets, but also in consumer markets users undertake autonomous innovation efforts.

The respondents were asked to describe their idea. The user inventions were segregated into improvements of existing market offers and concepts for new products. The first category includes modifications of existing product parts as well as the addition of new elements to

¹⁰ The users completed the questionnaire in the presence of the researchers and were asked to provide feedback concerning the comprehensibility and the interpretation of the questions. Several changes were included into the questionnaire in order to increase the clarity, to avoid misinterpretations and to reduce the answering time.

existing goods. The architecture and the main functionality of the improved products remain the same. The category “ideas for new products” comprises all inventions which lead to a new product architecture or which offer a new functionality.

- Improvements of existing outdoor-products are for example the addition of small mirrors to helmets or glasses for mountaineering (to see following climbers without moving head); more durable stoppers for the small ropes on outdoor-clothing; improved climbing iron; new clothing designs for women; ice axes adjustable for height.
- Examples for new outdoor-products are a foldable wind protection for stoves; a gadget for pressing out tubes; a new bike pick up (not necessary to lift up the bike on the roof of the car).

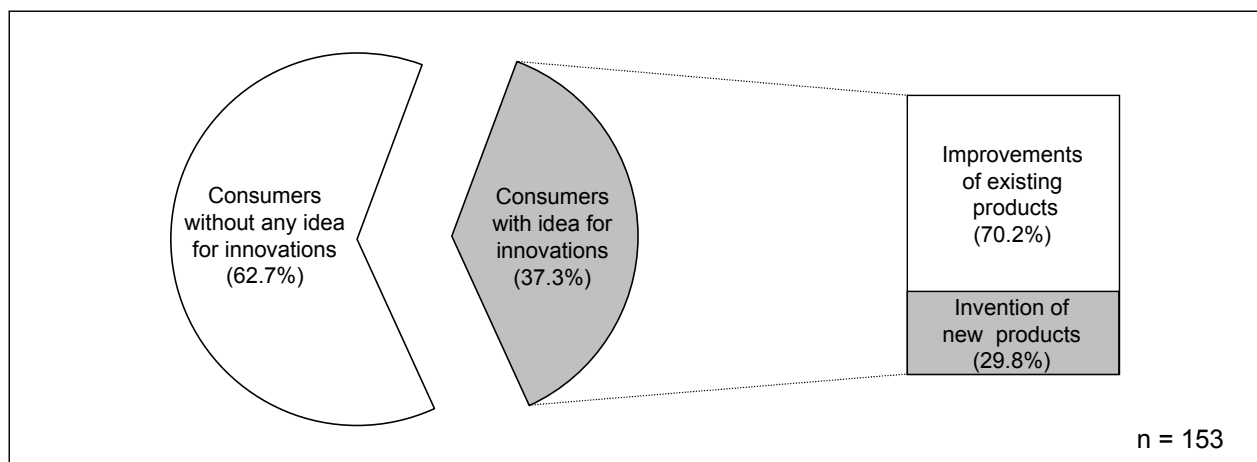


Figure 1: Innovation efforts on the side of the consumers

Approximately two thirds of the innovating consumers (70.2%) deal with small improvements of existing products (figure 1). Less than one third (29.8%) indicates that they invented a new problem solution which is not offered by the manufacturers of outdoor products.

Stage of development of the idea			
	Not drawn up yet	Drawings and drafts	Prototypes and marketed products
Percent of users with idea	29.8%	43.9%	26.3%
Percent of all users	16.4%	11.1%	9.8%

n = 57

Table 3: Stage of development of the ideas

The respondents were asked to indicate how far they developed their idea. Most of the innovative users did not translate their ideas into reality (see table 3). One in three respondents (29.3%) has the idea in mind but has not drawn it up. Almost half of the users developed drafts or drawings (43.9%). Still, four in ten respondents realized their idea by constructing a prototype (17.5%) or by even developing marketable products (8.8%). Thus, more than 9% of the total user sample developed at least a prototype.

It could be assumed that the stage of development of ideas for the improvement of existing products is on average higher than for ideas for new products. After all, it seems easier for consumers to work on smaller changes than on the realization of totally new problem solutions. The contrary is true (see figure 2).

The majority of users with ideas for novel products developed prototypes (41.2%) or tried to market their products (29.4%) whereas most of the users who conceived an improvement of existing products had not drawn their idea (37.5%) or just worked on preliminary drafts (55%). The difference is significant at the 1%-level. The newness of the idea seems to foster the autonomous development efforts of the user. The expected innovation-related benefit resulting seems to be higher the more the new solution differs from existing products in the marketplace.

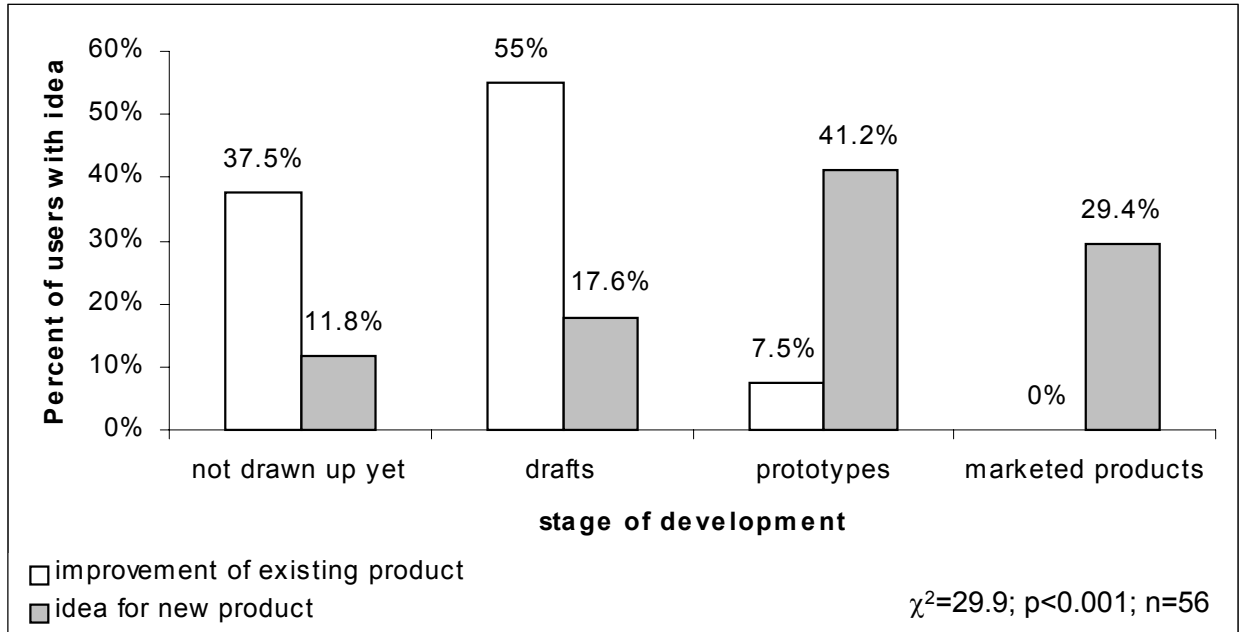


Figure 2: Connection between stage of development and newness of ideas

4.2 Impact of user characteristics on innovation efforts

Here we explore whether it is possible to discriminate between innovative and totally passive consumers via the user characteristics discussed in chapter 2.2. In order to determine the relative importance of the characteristics, we compared the users that developed an idea for an improved or new product (37.3% of the outdoor users) with those who have never showed any innovation effort (62.7% of the user sample). In the following analysis, the dichotomous innovation activity (developing vs. not developing ideas for innovation) serves as the dependent variable. The value of this variable is to be predicted by the user characteristics (facing new needs, dissatisfaction with existing products, financial reward, fun in innovating, use experience and know-how concerning materials, product and technologies). These characteristics were measured by direct ratings on a five-point rating scale.

The independent variables and the interactions between them, can be combined in a LOGIT model. It is used for a not continuous endogenous variable whereas no restrictions on the values that the exogenous variables take on are made (Aldrich/Nelson 1984; Agresti/Finlay 1997). The application of the LOGIT model requires the independent variables not to be correlated.

Therefor an exploratory factor analysis was conducted in order to reduce similar user characteristics to a smaller number of uncorrelated, underlying factors.

As a result three factors were extracted from the eight variables. They explain 70.5% of the variance. The factor loadings are unambiguous and can be interpreted in a meaningful way. The labels of the resulting factors are given in table 4.

The first factor contains all variables that measure the user expert status (product-related knowledge, use experience) and the fun in dealing with outdoor products. This finding is in alignment with the central assumption of the Human Resource Approach and indicates that the know-how of a user and his willingness to exploit his abilities are linked. The first factor is named "commitment to product field". Factor 2 consists of two benefit variables (facing new needs, dissatisfaction with existing products) by which it is measured to what extent consumers expect to profit via the use of an innovation. This factor is labeled "innovation-related core benefit". Expected financial benefit is the only variable that has a high loading on the third factor. Thus, the label "expected financial benefit" was chosen.

Variables	Factor 1 Commitment to product field	Factor 2 innovation- related core benefit	Factor 3 expected financial reward	Communa- lity
Know-how concerning technologies	0.812	0.147	0.097	0.690
Know-how concerning materials	0.808	-0.132	-0.033	0.671
Know-how concerning products	0.771	0.297	0.059	0.687
Intensity of use (use experience)	0.695	0.293	0.009	0.570
Fun by dealing with innovations	0.683	0.042	-0.166	0.772
Dissatisfaction with existing products	-0.034	0.877	-0.113	0.784
Facing new needs	0.346	0.807	0.012	0.969
Financial benefit (extrinsic)	-0.024	-0.084	0.981	0.497
Variance explained	37.24%	20.54%	12.70%	

Principal component analysis (Eigenvalues>1); Varimax-Rotation; n=153.

Table 4: Factor analysis of user characteristics

These three factors and the interactions between them were integrated as independent variables in a LOGIT model. As cited above the result of the dichotomous innovating decision (generating vs. not generating an idea for innovations) served as dependent variable in the analysis.

The findings are presented in table 5. All measures indicate a good fit of the estimation model. The rate of correct classified respondents is 91.03%.¹¹ The two factors "commitment to product field" and "innovation-related core benefit" are statistically significant while the third factor "expected financial benefit" is not significant. All interactions between the three factors do not have significant LOGIT coefficients and were therefor excluded from the model. This general finding is supported by additional outcomes related to the variables that form the basis of the two significant factors of the LOGIT analysis. We briefly describe and interpret the findings in the following sections.

User characteristics	LOGIT-coefficient ¹²	Standard error	Wald statistic
Commitment to product field	2.1080	0.507	17.29 (p<0.0001)
Innovation-related core benefit	3.1063	0.558	30.99 (p<0.0001)
Expected financial benefit	-0.0292	0.287	0.059 (n.s.)
Constant	1.5909	0.428	0.009 (p<0.001)

-2 log likelihood=64.572; $\chi^2=124.69$ (p<0.001); McFaddens R²= 0.659; n=153.

Table 5: LOGIT model to determine the influence of user characteristics on innovation efforts

4.2.1 Commitment to product field

Further analysis shows that the **use experience** is an important variable to distinguish innovating from non-innovating consumers. The respondents were asked how many days within

¹¹ This rate is much higher than the "proportional chance criterion" (PCC) which equals 53.22%. Also the classification rate in the smaller group of users with idea is very high (84.62%).

¹² In this survey a positive LOGIT coefficient indicates that it is more likely that a user generates an idea for innovations if the corresponding factor takes high values. The coefficient itself indicates the change of the Logit of the dependent variable if the independent factor changes in one unit.

a year and for how many years they have been active in outdoor-sports. It is showed in table 6 that innovating users on average do outdoor sports more frequently within a year and they have more years experience in the use of outdoor-related products.

Variable	innovating users ^a		non-innovating users ^b		t-value (df)
	\bar{x}	s.d.	\bar{x}	s.d.	
Frequency of use (days per year)	55.21	59.96	33.44	33.20	-2.931 (p<0.01) (145)
Total period of use (years)	13.61	10.08	10.56	8.55	-1.969 (p<0.1) (147)
Number of different sports	2.84	0.96	1.96	0.94	-5.556 (p<0.001) (150)

^an=56; ^bn=93.

Table 6: Use experiences of innovating and non-innovating consumers

However, not only the amount but also the variance of use experiences differ between the two user groups. Innovating consumers do more different types of outdoor-sports than non-innovating customers. It seems that diverse impressions and experiences foster associations between different mental events. This, in turn makes creative thinking more probable. The users combine their experiences of different sports and by that generate new ideas.

Frequency of use of the following information sources ^a	Innovating users ^b		non-innovating users ^c		t-value (df)
	\bar{x}	s.d.	\bar{x}	s.d.	
Retailers	2.76	1.06	2.86	1.12	0.537 (n.s.) (145)
Outdoor journals	2.07	1.02	2.22	1.04	0.872 (n.s.) (150)
Other outdoor sportsmen	1.80	1.00	2.72	1.17	4.870 (p<0.001) (144)

^aRating scales were used (1=very often; 5=never); ^bn=56 ^cn=93; n.s. = not significant.

Table 7: Information behavior of innovating- and non-innovating consumers

Also the effect of **product-related knowledge** on innovation activities of the consumers is confirmed by further analysis. As seen in table 7, consumers with ideas for innovations show a more intensive information search behavior. They seek more often information about new products than their non-innovating counterparts. However, only the information exchange with other sportsmen differs significantly between the two user groups. A high level of informal communication rather than the search for formal information via retailers and outdoor journals can to some extent explain the generation of innovative ideas.

Additional support for the importance of technical know-how is provided by the findings in figure 3. The professions of the respondents were segregated into the three categories non-technical, technical/craftsman and outdoor professions. The fraction of innovating customers in the group of users with technical or craftsman profession (64.3%) is higher than in the group of consumers working in non-technical jobs (28.6%). Innovating consumers seem to transfer their “professional” technical know-how to solve technical problems in their private life.

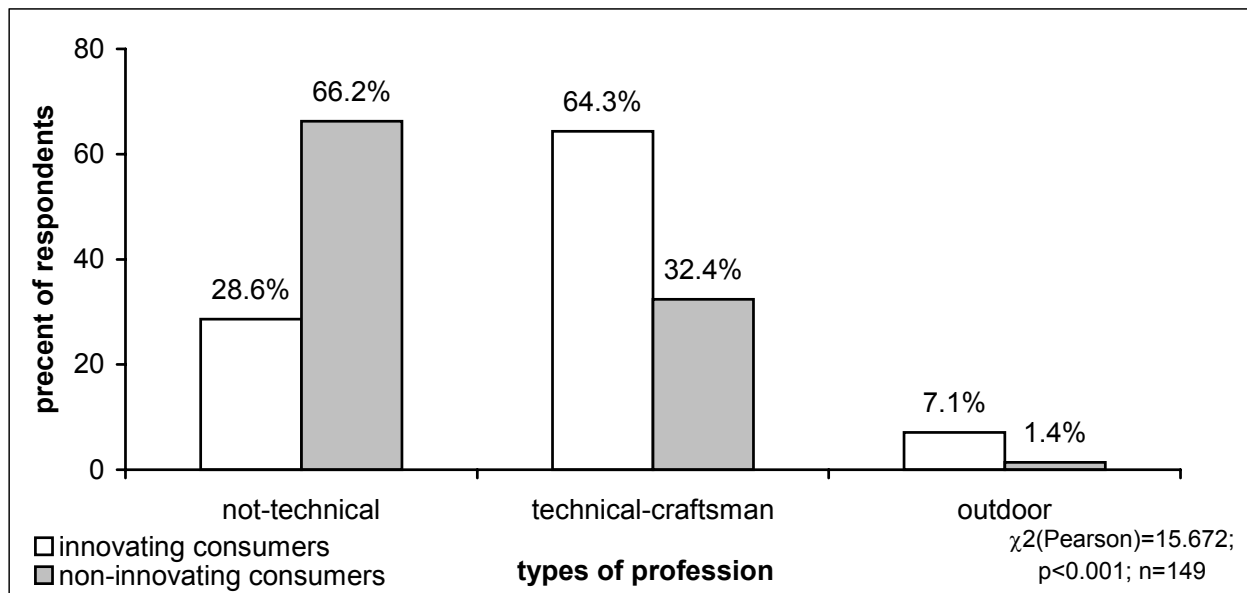


Figure 3: Professions of innovating and non-innovating consumers

4.2.2 Innovation-related core benefit

The high LOGIT coefficient for the factor ”innovation related core benefit” can also be confirmed by further findings. The respondents were asked to indicate the time after which they

usually buy new outdoor-related products. The variable "speed of adoption" may serve as a proxy measure for the high expected benefit of innovations (Urban/von Hippel 1988). Consumers, who in general adopt innovations within a product field early in the diffusion process are supposed to perceive a high benefit by using the new products (Robertson 1971; Sheth 1994; Rogers 1995). This in turn indicates that these users often face needs not fulfilled by existing market offers.

Remarkable differences exist between the two user groups (figure 4). On the one hand, one in four innovating users (24.6%) buy new products immediately after market launch. On the other hand, not more than 1.1% of the innovation-passive users usually adopt the new market offers that early in the diffusion process. On the contrary, half of the non-innovating consumers (50.5%), but only 14% of the innovating users usually buy well-established, reliable products. This finding indicates that consumers with ideas for innovations expect a higher benefit of new outdoor-related products.

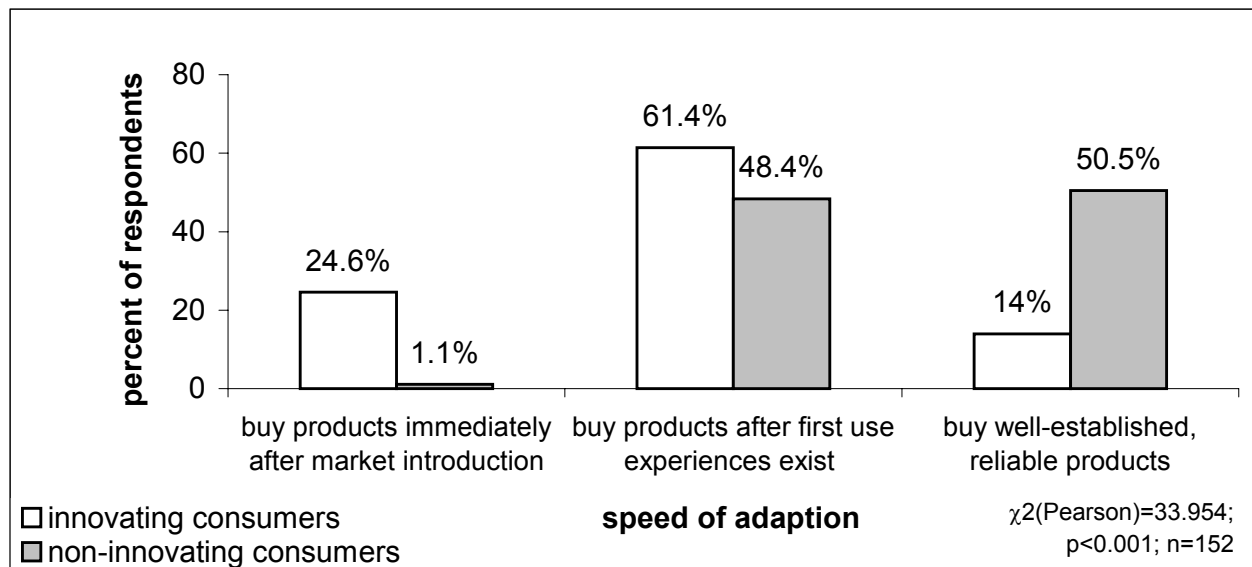


Figure 4: Speed of adoption of innovating and non-innovating consumers

4.2.3 Expected financial benefit

The LOGIT factor for the expected financial benefit is not significant (see table 4). The general expectation to be financially rewarded for innovations cannot distinguish between innovating and non-innovating users. This is in contrast with empirical evidence in industrial

markets in which economic benefit expectations proved to be the main trigger for user driven innovations (von Hippel 1988, chapter 5).

The finding is supported by the fact that only a small fraction of the innovating users attempted to exploit their innovation output. For instance not more than 8.9% of the users who developed an idea for innovations tried to commercialize their invention. The innovating respondents seem not able to profit by selling patents or by licensing their innovation-related knowledge either. Of all innovating users only 13.1% tried to apply for a patent on their idea.¹³ A third route towards capturing financial benefit from an innovation is to obtain voluntary compensation from the manufacturers. The users could expect to be rewarded by money or free products for their innovative contribution.

Did you expect to obtain the following reward when you contacted a manufacturer?	Mean	Standard deviation
Financial compensation	4.33	1.15
Products	3.71	1.27

Rating scales were used (1=very true; 5=not at all true); n=21.

Table 8: Expectation of a voluntary compensation from the manufacturers

Again, the results in table 8 do not indicate that this is a strong motivator for innovating customers of outdoor-related products. The respondents who developed an idea and subsequently contacted a manufacturer did not expect an economic compensation.

4.3 User-manufacturer interaction

The generation of innovating ideas can be the starting point of an interaction between the user and a manufacturer. Two different levels of interaction intensity can be differed (figure 5):

1. The innovating user contacts a manufacturer in order to transfer his idea for innovation.

¹³ These findings could be interpreted as an indicator for the low attractiveness of the ideas. Users might anticipate the low importance of their developments. However, this seems not to be true. A big fraction of the innovating users (62,5%) realized their invention for own use. It seems that they had been convinced of the usefulness of their ideas. Morrison et al. (2000) found in their survey of innovating OPAC-users that about 70% of the provided user improvements are of at least “medium” importance from the point of view of commercial OPAC-system vendors.

- The innovating user and the contacted manufacturer cooperate in order to develop a marketable product.

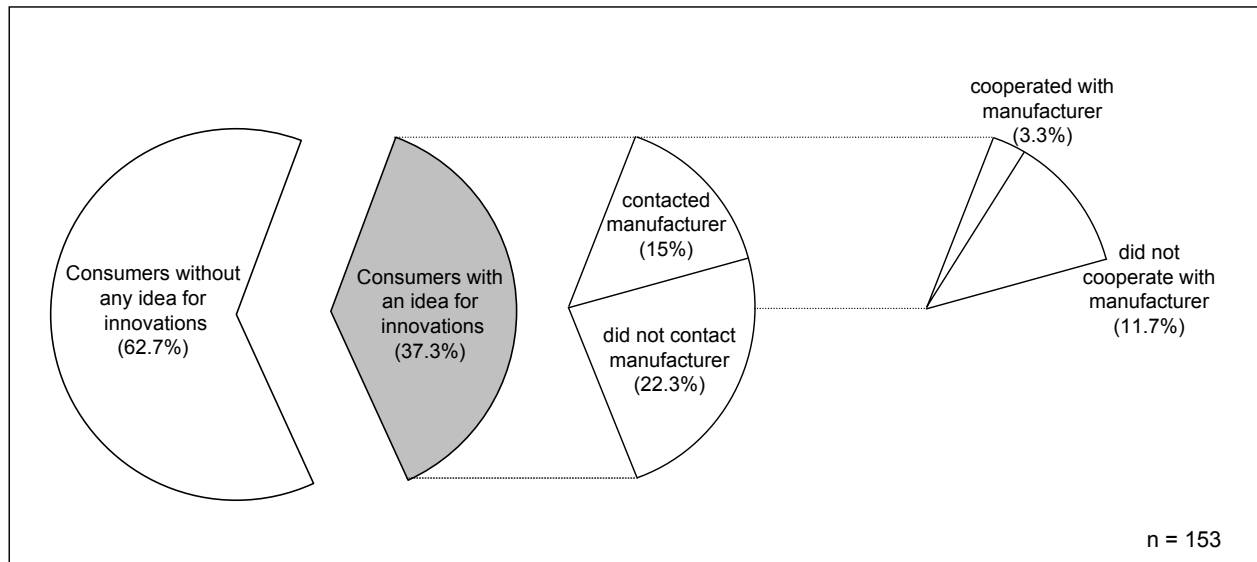


Figure 5: User-manufacturer interaction

As is seen in figure 5, 15% of all respondents –this equals 40% of the users with an idea– took the initiative to approach at least one manufacturer in the outdoor industry. The majority of the innovating users seems not to be interested in transferring their innovation output to outdoor-firms. These users were asked to indicate the reasons for this. The findings in table 9 show that no specific, negative motivated reason can be detected.

Please indicate what hindered you in contacting a manufacturer:	Mean	Standard deviation
No general interest of realization of idea by manufacturers	2.29	1.58
Fear of being cheated by manufacturers	3.04	1.38
Fear of a time-consuming cooperation with manufacturers	3.25	1.43
Not expecting appropriate rewards	3.25	1.26
Disappointing prior experiences with manufacturers	4.21	1.23

Rating scales were used (1=very true; 5=not at all true); n=34.

Table 9: Barriers for contacting a manufacturer

It was already shown (see section 4.2.3) that customers of outdoor products do not expect to benefit from licensing their knowledge and they do not anticipate voluntary compensation from the manufacturers. This is underlined by the ratings in table 9. The innovative users do not have a general interest in seeing their ideas realized by a manufacturer (Mean=2.29). Often, they do without contacting because of the lack of positive incentives.

Almost two thirds of the consumers without manufacturer contact (62.5%) indicate that they implemented their ideas and solutions in their own outdoor-activities. Obviously they are satisfied with the realization of their idea for personal use and do not aspire to develop products in cooperation with manufacturers.

If a big fraction of innovating users do not attempt to transfer their innovation related knowledge, a major challenge arises for marketing research in the front end of the innovation process. Manufacturers which ignore the innovation potential of their customers will consequently miss promising innovations developed by customers exclusively for their personal use. They even risk losing their competitive advantage if the ideas are detected and successfully exploited by competing firms. Therefore, manufacturers will have to take the initiative to search for innovating users and for that suitable market research techniques have to be to their disposal.

5 Discussion

In this survey we have explored the innovation activities and characteristics of 153 users of outdoor-related consumer products. The survey reveals two major results:

- First, the analysis shows that more than one third of the respondents generated ideas for improved or new products. More than 9% of the user sample built product prototypes or even marketable products. This provides new insights for research on user innovation activities. Previous studies mainly determined the fraction of **innovations** that were developed by users within an industry. In this study we examined for the first time the fraction of **users** within a given population of consumers who develop innovative ideas. The findings lead to the conclusion that the innovation efforts are disseminated through an important portion of a user community. Therefore, the commonly held assumption in market research, that end users are

both, not motivated and not capable for own innovation efforts, seems not to hold true for the market of outdoor-related products.

- Second, the findings indicate that specific user characteristics discriminate between users who create ideas for improved or new products and users who remain passive. This implies that consumer goods companies can identify and therefor utilize innovating users as a resource for the development of new products and services.

Why do users innovate?

In contradiction to empirical evidence in industrial markets, the anticipation to profit economically does not have a major impact on user innovations in the outdoor industry. Expectations concerning innovation-related financial reward cannot distinguish between innovating and non-innovating users. It is not the financial benefit, but the chance to execute their sports more effectively which motivates the outdoor users. As it becomes apparent from the findings, this motivation mainly results from the existence of specific needs that are not yet fulfilled by existing market offers. While executing their sport, some users realize a discrepancy between the expected and experienced performance of the products. This leads to dissatisfaction with the current market offers so that these users profit directly by self-developed innovations. By using improved or new products they could practice their sporting activities faster, , safer, more easily, with more fun etc. These benefits seem to be high enough to trigger user innovations, particularly when the costs for the development of ideas, concepts, and prototypes are comparatively low. Innovation costs are low for users with a high commitment in the product field (high level of use experience, product related know-how and fun by dealing with their products). In fact, the findings indicate that users with more expertise and product-related involvement are more likely to innovate, other things being equal.

As it is shown by this survey, high expected benefit in combination with high commitment to the product field lead to user innovations in local user communities - here the users of outdoor products in Germany. Even if these users do not lead the world with respect to a particular trend or area, for them it can pay to innovate. In most consumer markets no tight worldwide user-

networks exist which enable users to exchange information about user-developed innovations.¹⁴ If they expect a high benefit and in case they have the required abilities, they do not want, and do not have to wait for other users or manufacturers to come up with a tailor made solution. They are forced and willing to develop their own ideas instead of searching for an already existing solutions for their problems. Consequently, it can be assumed that an important share of the user ideas identified in this study have already been developed by users in other local user communities.

Implications for market research in the front end of innovation

Innovating users in outdoor-sports often gladly do without contacting a manufacturing firm in order to transfer their ideas, concepts or prototypes. They do not attempt to exploit their knowledge commercially and primarily try to realize their ideas for private purposes only. Consequently, a manufacturer which tries to benefit from the user potential for innovation is forced to actively identify and integrate the innovative users.

The empirical findings reveal that this identification can be based on characteristics able to distinguish between innovating and non-innovating users. With these characteristics a quantitative, standardized screening approach might be a useful alternative to a more qualitative, not standardized networking search process. The first approach is based on a survey covering a large user group via written questionnaires or standardized telephone interviews. The objective is to explore whether the respondents show the relevant user characteristics. The high potential users can subsequently be contacted and interviewed in more detail. On the contrary the second approach, the networking search process, is based on interviews with a small number of users who know other likely innovating users.¹⁵ These persons can be interviewed subsequently and in turn name other potential lead users.

The standardized search within large user groups via user characteristics seems more promising in markets where it is difficult for one user to realize the innovation potential of other

¹⁴ However, the internet might become an important platform for information exchange between consumers around the world.

¹⁵ The networking search process has been often used to identify innovating users in different applications of the lead user method (Urban/von Hippel 1988; Herstatt/von Hippel 1992).

users. This is true if no tight networks between users of a product or service category exist. Distant relationships are characteristic for all markets where there is no possibility for users to get in contact and to exchange information, for instance in user groups, hobby clubs or user meetings. This situation is probable for all product and service categories where the consumption of the goods can be done independently from other consumers or where there is no advantage (i.e. more fun) for the user to come together during the use or consumption of the products. In these cases user innovations are not observable for other users. The innovations stay local and do not disseminate through a large user group.

All in all, situational factors can render the network approach less promising and lead to a higher efficiency of the standardized screening method applying the relevant user characteristics. For this, new procedures in market research are requested. Market research studies usually intend to produce representative results for the whole market segment. The findings concerning a sub-sample of customers are to hold true for the whole user population within a market. While this request is not to be doubted for most market research tasks, it seems not promising to pursue “discovering goals” in the front end of innovations. Manufacturers must therefore try to select not a representative sample of all users of today’s products, but a group of consumers who are willing and able to provide creative ideas for new products.

Approaches of qualitative market research are more suitable for the identification of innovative ideas. Qualitative surveys are very seldom based on representative samples (Calder 1994). The participating users are not selected via statistical but through problem related criteria. The researchers seek for participants who can help to describe and to understand a not well explored phenomenon. This problem related procedure is known as “theoretical sampling” (Strauss 1994; Wiedemann 1995). However, an analysis of ten textbooks with the title “market research” or “marketing research” indicates that the traditional market research literature does not provide insights for the design of these searching procedures (see table 10). Although 8 of ten books integrate a section dealing with qualitative methods and although 5 books deal with

techniques suitable for innovation projects, not a single book discusses specific selection procedures for innovative users.¹⁶

Textbooks	Dealing with qualitative-market research	Dealing with market research for innovations	Dealing with selection of innovative users
Tull/Hawkins (1990)	Yes	No	No
Kent (1993)	Yes	Yes	No
Malhotra (1993)	Yes	No	No
Aaker/Kumar/Day (1995)	Yes	Yes	No
Kinnear/Taylor (1996)	No	Yes	No
Proctor (1997)	Yes	Yes	No
Burns/Bush (1998)	Yes	No	No
Hague/Jackson (1999)	Yes	Yes	No
West (1999)	No	No	No
Wright (2000)	Yes	No	No

Table 10 Contributions of text books in market research to the selection of innovative users

Besides the sampling procedure, also the market research methods for data collecting need to be adapted to innovating users. In traditional market research surveys stimuli (e.g. questions, test products) that users have to deal with are fixed without involvement of the participants. The goal of these "feedback-studies" is primarily to test the response of the users to pre-determined stimuli. This focus pertains even for sophisticated market research techniques mainly designed for the new product development process. For instance the conjoint analysis uses different product concepts that are described in terms of attribute profiles as pre-determined stimuli. Through the evaluation of the different concepts, the contribution of the attributes to the utility function of the users can be calculated (Green/Srinivasan 1990). However, there is no chance for the identification of new product or service attributes, not represented in the existing problem solutions of the manufacturer. The users are not given the possibility to contribute new ideas and concepts to the innovation process (Davis 1993). Newly developed qualitative research

¹⁶ All text books in English language published after 1989 and registered in the OPAC of the Technical University of Hamburg were included in this analysis.

techniques reflect a more active view of the customers. An open dialogue between researchers and users is a central element of these methods (e.g. group discussions, qualitative interviews) (Kent 1993; Malhorta 1993). Participating customers are allowed to make creative contributions. They can modify or complete the tested stimuli (Aaker et al. 1995). By this, manufacturers may get new insights into the needs, requests and ideas of the innovating customers. However, the applicability of qualitative methods within the early stages of development projects has not been widely explored. Particularly, little is known about an appropriate integration of single methods to a concept of user-manufacturer-interaction which embraces all stages of the innovation process.

This study shows that consumers, willing and able to innovate, do exist and provides preliminary insights into user characteristics which discriminate innovating from non-innovating users. Further research is necessary to integrate these findings into new sampling procedures and data collection methods in applied market research.

References

- Aaker, David A./Kumar, V./Day, George S. (1995): "Marketing research", 5. Edition New York, John Wiley&Sons.*
- Agresti, Alan/Finlay, Barbara (1997): "Statistical methods for the social sciences", 3. Edition, Upper Saddle River, Prentice Hall.*
- Aldrich, John H./Nelson, Forrest D. (1984): "Linear probability, logit and probit models", Beverly Hills, Sage.*
- Baker, Norman R./Green, Stephen G./Bean, Alden S. (1986): "Why R&D project succeed or fail", in: Research Management, 29 (6), pp. 29-34.*
- Biemans, Wim G. (1991): "User and third-party involvement in developing medical equipment innovations", in: Technovation, 11 (3), pp. 163-182.*
- Bolman, Lee G./Deal, Terrence E. (1984): "Modern approaches to understanding and managing organizations", San Francisco, Jossey-Bass.*
- Calder, Bobby J. (1994): "Qualitative marketing research", in: Principles of marketing research, Bagozzi, R. P. (ed.), Cambridge, Basil Blackwell, pp. 50-72.*
- Davis, Robert E. (1993): "From experience: The role of market research in the development of new consumer products", in: Journal of Product Innovation Management, Vol. 10 (2), p. 309-317.*
- Dosi, Giovanni (1991): "The research on innovation diffusion: An assessment", in: Diffusion of technologies and social behavior, Nakicenovic, N./Grübler, A. (ed.), Berlin, Springer-Verlag, p. 179-208.*
- Enos, J. L. (1962): "Petroleum progress and profits: A history of process innovation", Cambridge, Mass., MIT Press.*
- Freeman, C. (1968): "Chemical process plant: Innovation and the world market", in: National Institute Economic Review, Jg. 45 (August), S. 29-57.*
- Green, Paul E./Srinivasan, V. (1978): "Conjoint Analysis in Marketing: New developments with implications for research and practice", in: Journal of Marketing, 54, pp. 3-19.*
- Hague, Paul/Jackson, Peter (1999): "Market research: A guide to planning, methodology and evaluation", 2. Edition, London, Kogan Page.*
- Herstatt, Cornelius/von Hippel, Eric (1992): "From experience: Developing new product concepts via the lead user method: A case study in a 'low tech' field", in: Journal of Product Innovation Management, Vol. 9 (3), p. 213-221.*

Herzberg, Frederick/Mausner, Bernard/Bloch Snyderman, Bloch (1967): "The motivation to work", 2. Edition, New York, Wiley.

Kent, Raymond A. (1993): "Marketing research in action", London, Routledge.

Knight, K. E. (1963): "A study of technological innovation: The evolution of digital computers", Unpublished Doctoral Dissertation; Canergie Institute of Technology.

Laurent, Gilles/Kapferer, Jean-Noel (1985): "Measuring consumer involvement profiles", Vol. 22 (1), p. 41-53.

Lawler III, Edward E. (1977): "Motivierung in Organisationen", Bern, Verlag Paul Haupt - UTB für Wissenschaft.

Lawler III, Edward E. (1971): "Pay and organizational effectiveness", New York, McGraw-Hill.

Lawton, Leigh/Parasuraman, A. (1980): "So you want new product planning to be productive", in: Business Horizons, December 1980, No. , p. 31.

Lionetta, William G. (1977): "Sources of innovation within the pultrusion industry", S.M. Thesis, Sloan School of Management, Massachusetts Institute of Technology, Cambridge, Mass.

Malhotra, Naresh K. (1993): "Marketing research: An applied orientation", Englewood Cliffs, Prentice-Hall International.

Mansfield, Edwin (1968): "The economics of technological change", New York, W. W. Norton & Company.

Mansfield, Edwin (1988): "Industrial R&D in Japan and the United States: A comparative study", in: American Economic Review, 78 (2), pp. 223-228.

Morrison, Pamela D./Roberts, John H./von Hippel, Eric (1999): "Innovation by lead users in a "second-tier" market: Patterns in product modification and information sharing", Working Paper, WP 4080; Sloan School of Management, Massachusetts Institute of Technology, Cambridge, Mass.

Neuman, Jan (1994): "Outdoor activities: Various opportunities of application and development", in: Outdoor activities, Neuman, J./ Mytting, I./Brtnik, J. (ed.), Prag, Charles University, p. 23-31.

Riggs, William/von Hippel, Eric (1994): "Incentives to innovate and the sources of innovation: The case of scientific instruments", in: Research Policy, 23 (4), pp. 459-469.

Robertson, Thomas S. (1971): "Innovative behavior and communication", Pennsylvania, Holt/Rinehart and Winston.

Rogers, Everett M. (1995): "Diffusion of innovations", 4. 4, New York, The Free Press.

Schmookler, J. (1972): "Patetnts, invention, and economic change", Cambridge, Mass., Harvard University Press.

Shah, Sonali (2000): "Sources and patterns of innovation in an consumer products field: Innovations in sporting equipment", Working Paper, WP 4105; Sloan School of Management, Massachusetts Institute of Technology, Cambridge, Mass.

Shaw, Brian (1985): "The role of the interaction between the user and the manufacturer in medical equipment innovation", in: R&D Management, Vol. 15 (4), p. 283-292.

Sheth, Jagdish N. (1994): "Perceived risk and diffusion of innovations", in: Kundennähe realisieren, Tomczak, T./Belz, C. (ed.), St. Gallen, Verlag Thexis, p. 173-188.

Stein, Barry S. (1989): "Memory and creativity", in: Handbook of creativity, Glover, J. A./Ronning, R. R./Reynolds, C. R. (ed.), New York, Plenum Press, p. 163-176.

Teubal, Morris (1979): "On user needs and need determination: Aspects of the theory of technological innovation", in: Industrial innovation: Technology, policy, diffusion, Baker, M. J. (ed.), London, The Macmillan Press LTD, p. 266-293.

Tull, Donald S./Hawkins, Del I. (1990): "Marketing research: Measurement and method", 5. Edition, New York, Macmillan Publishing Company.

Urban, Glen L./von Hippel, Eric (1988): "Lead user analyses for the development of new industrial products", in: Management Science, Vol. 34 (5), p. 569-582.

Utterback, James M./Allen, Thomas J./Hollomon, J. Herbert/Sirbu, Marvin A. (1976): "The process of innovation in five industries in Europe and Japan", in: IEEE Transactions on Engineering Management, Vol. EM-23 (1), p. 3-9.

VanderWerf, P. (1990): "Product tying and innovation in U.S. wire preparation equipment", in: Research Policy, 19; pp. 83-96.

von Hippel, Eric (1976): "The dominant role of users in the scientific instrument innovation process", in: Research Policy, Vol. 5, p. 212-239.

von Hippel, Eric (1977): "The dominant role of the user's in semiconductor and electronic subassembly process innovation", in: IEEE Transactions on Engineering Management, 24 (2), pp. 60-71.

von Hippel, Eric (1982): "Get new products from customers" (2), p. 117-122.

von Hippel, Eric (1986): "Lead users: A source of novel product concepts", in: Management Science, Vol. 32 (7), p. 791-805.

von Hippel, Eric (1988): "Lead users: A source of novel product concepts", in: Innovation: A cross-disciplinary perspective, Gronhaug, K./Kaufmann, G. (ed.), Oslo, Norwegian University Press, p. 387-406.

von Hippel, Eric (1988): "The sources of innovation", New York, Oxford University Press.

von Hippel, Eric/Thomke, Stefan/Sonnack, Mary (1999): "Creating breakthroughs at 3M", in: Harvard Business Review, pp. 3-9.

Voss, Christopher A. (1985): "The role of users in the development of applications software", Vol. 2 (1), p. 113-121.

Vroom, Victor H. (1967): "Work and motivation", 3. Edition, New York, John Wiley & Sons.

Weisberg, Robert (1986): "Creativity: Genius and Ohter Myths", New York, Freeman.

Wright, Len Tiu/Crimp, Margaret (2000): "The marketing research process", 5. Edition, Harlow, Prentice Hall.