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A literature review of publications in business press

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Abstract

Integrating lead users into the product development process is a promising source of innovations. While the lead user approach is clearly established in academia, the implementation into management practice is ambiguous. Conducting a literature review of 255 articles in business press we show the diffusion in praxis and analyze coherency to the academic perspective. We derive propositions and identify inconsistencies to the current theoretical understanding, particularly regarding the definition, identification process and methods. We reveal latest developments in praxis and provide a basis for the adaptation of the classical lead user approach.

Keywords

Lead user; diffusion; adoption; practical implementation; business press review

1. Introduction

Technological change, globalization, and individualization of consumer's demand increase the necessity for firms to create innovations (Reichwald, Piller 2006). In order to cope with these challenges firms open their innovation process (Chesbrough 2003), utilize local knowledge (Lüthje et al. 2003) and integrate external stakeholders, especially users (von Hippel 1995). Research has identified users as sources of innovation long ago (Bogers et al. 2010; Franke et al. 2006; von Hippel 1988). Integrating users into the innovation process benefits firms due to their creativity and knowledge (Lilien et al. 2002), as well as customer needs insights (Schreier et al. 2007). Their integration can reduce the inherent failure risk of new product developments (Enkel et al. 2005), especially as up to 90% of new product launches fail (Reichwald et al. 2007). One special type of users are 'lead users', who face needs before the market and develop solutions for themselves (Herstatt, von Hippel 1992; von Hippel 1986).

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The lead user approach was developed in the 1980's and gained international traction soon (Herstatt, von Hippel 1992). Pioneering lead user innovations have been identified in the field of extreme sports (e.g. mountain biking, snowboarding) or household equipment (e.g. coffee filter) (Bogers et al. 2010). Common examples of firms who have successfully integrated lead users are 3M, Johnson & Johnson or Hilti (Piller, Reichwald 2006; Lüthje, Herstatt 2004). Nevertheless, beyond these 'standard' examples it is unclear if the integration of lead users is a frequently, systematically used approach in praxis, especially in view of recent developments like open collaborative innovation and new mechanisms like crowdsourcing and netnography (Bilgram et al. 2013), which have facilitated the integration of lead users. Moreover, after 30 years of theoretical elaboration we are interested if the lead user approach deployed in praxis is consistent with the academic understanding or whether differences exist. Thereby it is surprising, that no analysis before has considered the deployment of the phenomenon in business circles, particularly as a key dimension of user innovation is to include customers and practitioners. We target this lack and analyze the state of the art of lead user innovations in praxis.

1.1. Research Objective

This paper responds to above gaps and pursues the following questions: Is the understanding of lead user innovations in theory and praxis coherent or not? Do firms conduct the classical, theoretical approach or have they modified or even advanced the process and methods? Are typical methods like pyramiding and screening common for the identification of lead users or are emerging trends and developments like crowdsourcing, web monitoring or netnography more utilized?

We answer these questions by analyzing the implementation of the lead user approach in praxis. Therefore we conduct a literature analysis of 255 publications in the German-speaking business press. Since there is distinctive scientific research regarding lead user innovations in Germany (Piller, Walcher 2006; Gassmann et al. 2005; Lüthje et al. 2005; Franke, von Hippel 2003; Herstatt, von Hippel 1992), it represents an adequate exemplary market to analyze the praxis diffusion. Our management press concentrated literature review has - to our knowledge - not yet been conducted, but reveals important insights for theory and praxis.

Our findings have important implications concerning the diffusion of knowledge between theory and management practice, the adaption of altered circumstances, and if the understanding between theory and praxis is coherent. The detailed content analysis of the lead user types, characteristics, opportunities and risks, methods, processes and responsibilities reveals inconsistencies in the transfer of knowledge. The discussion shows differences in the understanding

of lead users between theory and praxis, especially regarding the definition, process and methods. Firms create their own taxonomy of lead users and define new characteristics. Methods are adopted particularly to emerging mechanisms of the Web 2.0 and Social Media. Evolving technologies, especially online based, and external circumstances have an essential influence in this process. We identify different approaches for the integration of lead users and constitute this by diverse cases. Finally, we clarify if the lead user approach has arrived in praxis and reveal that the approach is applied in a wide range of industries and independent of firm sizes.

1.2.   Lead user theory and academic understanding

The earliest examples of reported user innovations date back to the eighteenth century (Bogers et al. 2010). Nevertheless, the work of von Hippel was the first clearly differentiating between user and producer innovation and highlighting users as sources of innovation (von Hippel 1986). Whereas user innovations are made by individuals for their own use, producers develop goods and services in order to sell them to customers (von Hippel 2005). The underpinning rationale of producers is to appropriate innovations and commercialize products. In contrast, users innovate because they cannot find suitable products in the market that satisfy their needs. Von Hippel details the scope of user innovations further and identifies that most innovations are developed by lead users. Lead users are a specific type of users that have two particular characteristics (von Hippel 1986, p. 796):

1. *"Lead users face needs that will be general in a market place - but face them months or years before the bulk of that marketplace encounters them, <u>and</u>*

2. *Lead users are positioned to benefit significantly by obtaining a solution to those needs."*

This typology evolves as representative definition within the academic literature and guides researchers in the realm of open and user innovation (Franke et al. 2013; Schweisfurth 2013; Wagner, Piller 2011; Franke et al. 2006). As the development of new products and services can be risky for companies, the integration of lead users is beneficial for them in order to minimize the risks associated with the new product development (Reichwald et al. 2007). According to von Hippel, *"they can serve as a need-forecasting laboratory for marketing research"* (von Hippel 1986, p. 792). The integration helps to develop products or services which will more likely be accepted by the customer since they fulfill their needs (Piller, Reichwald 2006). The lead user approach is consistent to the concept of Open Innovation whereby the innovation process is open in order to integrate external knowledge and creativity (Gassmann

2006). Lead users represent external sources of innovation who are integrated from outside into the firm (Enkel 2011).

In order to compare the understanding between theory and praxis as well as to identify inconsistencies between academia and business, it is also important to specify what lead users *are not*. A frequent assumption is that lead users equal early adopters, but they do not. *"Lead users are not the same as "early adopters" - users who are among the first people to purchase an existing product or service. Lead users are facing needs for products and services that* do not yet exist *on the market"* (Churchill et al. 2009, p. 7). Figure 1 visualizes this classification of lead users in comparison to further user types.
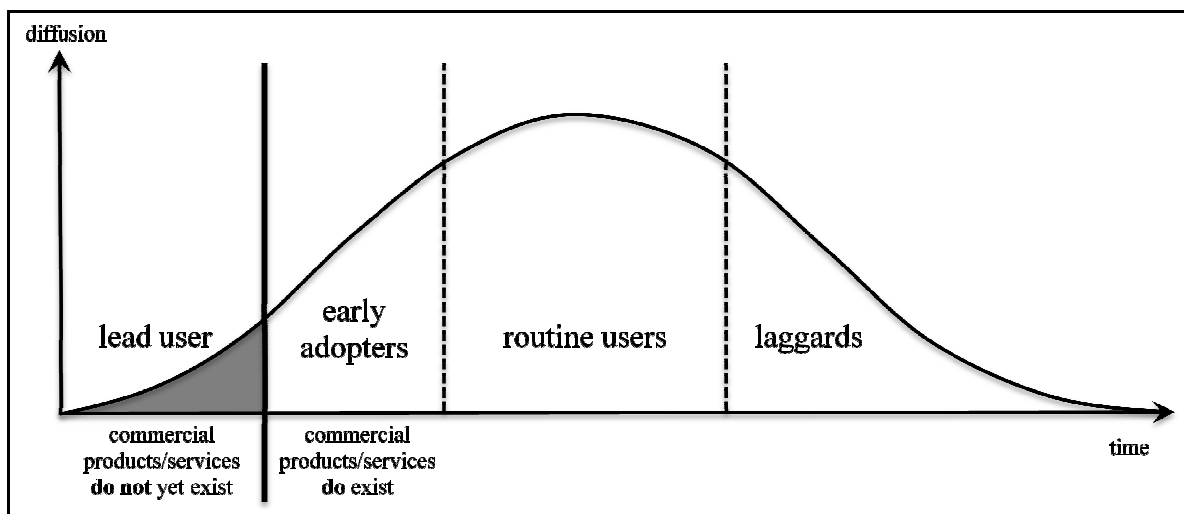

Figure 1: Classification of lead users compared to other categories of users[2]

The diagram curve shows the rate of product diffusion (y-axis) over time (x-axis). In the beginning commercial products do not yet exist, however lead users have already developed and spread the products (grey shaded area). After the introduction of commercial products, product diffusion increases, and early adopters - representing the first customers - buy the product. Thereafter routine users and laggards buy the product or make use of the existing service (Churchill et al. 2009).

Lead users can be identified through various methods. One well-known is the lead user method which was especially developed for the active integration of lead users (Herstatt et al. 2002). The lead user method aims to identify qualified and motivated users which are then integrated into the product development process. Thereby the company aims to develop ideas and concepts further for exploitation of innovative products and services (Herstatt 2007). The lead user method exhibits a suitable instrument for product creation especially in the early stages of the innovation process. Nonetheless, it is used either too less or not regularly and

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[2] Own illustration based on Churchill et al. 2009.

structured enough (Wagner, Piller 2011). Further methods for the integration of lead users are for example idea competitions and toolkits, whereby online-tools have gained in importance due to the development of the Web 2.0 within the last decade (Bartl 2010; Piller, Walcher 2006; Lüthje, Herstatt 2004).

Build on the classical understanding, the lead user approach is extended within scientific research into different directions, as seen in table 1.

Table 1: Extensions of the lead user approach

Author	Extensions of the lead user approach
Springer et al. 2006	Conceptual extension of the lead user approach into 'sustainable lead user' who are users that have - in addition to von Hippel's characteristics - a need for sustainability.
Shah, Tripsas 2007	Shah and Tripsas exhibit that users also commercialize their innovations and describe them as user entrepreneurs. They *"define user entrepreneurship as the commercialization of a new product and/or service by an individual or group of individuals who are also users of that product and/or service."*
Hoffman et al. 2009	Hoffman et al. choose an approach for the integration of users to the new product developments that differs from the the lead user approach: *"We propose that the right consumers to use for new product concept development possess what we call an "emergent nature," defined as the unique capability to imagine or envision how concepts might be developed so that they will be successful in the mainstream marketplace."* Based on their studies they show *"that consumers high in emergent nature are able to develop product concepts that mainstream consumers will find significantly more appealing and useful compared to concepts developed by typical, lead user or even innovative consumers."*
Fust et al. 2011	Fust et al. combine the lead user approach with characteristics of market experts in order to combine the concepts of lead users and user entrepreneurship. They define three characteristics of lead users*[3]: *1. Awareness of latent needs of typical customers* *2. Motivation and capability of satisfying these needs and moreover communicate them* *3. Diversity of perspectives which expresses itself in information about diverse products and services as well as personal experiences.*
Schweisfurth, Herstatt 2013	The authors identify that also lead users from inside the firm, embedded lead users, are a beneficial source of creativity and innovativeness.
Gehringer 2013	The lead user approach is adopted to the concept of technology push innovations, which are developed independent from the market's needs. Lead users, which are companies in this case, are involved in the creation of unfinished products in order to test and evaluate them.

It is open, whether the approach is also modified in praxis. Nevertheless, the classical approach defined by von Hippel (von Hippel 1986) is still the most common in scientific research (Bogers et al. 2010; Churchill et al. 2009; Piller, Walcher 2006). This theoretical understanding of the lead user approach serves as fundament for our following research. We will analyze the implementation status in praxis and compare this with the theoretical approach.

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[3] * The citations marked with * within this paper were translated from the German articles into English and were verified by an American native speaker.

2. Methodology

To give an overview about the position and understanding of lead users in business practice, we conduct a literature analysis of 255 business press publications. We focus our systematic research on practical business publications regarding lead user innovations in the German-speaking area. Previous literature analyses concerning innovation management and user innovation concentrate on academic publications (Dahlander, Gann 2010; de Jong, Vermeulen 2003; Garcia, Calantone 2002), but miss to include the 'real-world' view. In contrast, we reach out to practitioners magazines, and analyze for the first time the business press publications. This analysis reveals insights how the topic is communicated and deployed beyond academic theory and enables important insights not yet available or reachable with theoretical paper reviews.

Our research strategy follows the academic code of conduct and is orientated on theoretical recommendations as well as actual existing reviews to ensure a rigorous method (Fink 2010; Okoli, Schabram 2010; Garcia, Calantone 2002). In order to find appropriate business press we include two databases, one qualitative focusing on specific magazines (WISO), the other rather quantitative focusing on the magazines with the highest editions (Statista). The database **WISO Wirtschaftswissenschaften**, a frequently used database in business and social sciences (e.g. Reuschenbach 2012), is chosen (Reuschenbach 2012; Kollmann et al. 2011). WISO offers with 13 million references the largest German-speaking compilation of references and full texts (GBI-Genios Deutsche Wirtschaftsdatenbank GmbH 2013). WISO's professional journals include nearly 400 business magazines from various sectors in the area of Germany, Austria, Switzerland and Lichtenstein[4]. The database includes well-known magazines like *VDI nachrichten* (edition: 165.433[5]) or *Absatzwirtschaft* (edition: 29.737) as well as specific sources which are primarily known in their particular industries like *DBW Die Betriebswirtschaft* (edition: 700). This extensive mixture ensures an appropriate overview of many different industries and areas of application, even the specialized and smaller ones. However, the advantage of including specific magazines represents also a drawback as the database misses some highly circulated magazines and aiming at a wider audience. To mitigate this shortcoming, we include a second source in our analysis in order to integrate articles from the most frequently read business magazines. Based on an independent analysis of

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[4] List of magazines: http://www.wiso-net.de/quellenliste/Fachzeitschriften/alle?WID=70642-1330233-22829_1 The database only searches in magazines to which access exists. Since WISO only sells access to **all** magazines it can be taken for granted that every magazine is involved.
[5] The editions correspond to the magazine's newest media data.

Statista, the German leading statistics-company in the Internet, the 23[6] business magazines with the highest editions like *Handelsblatt* or *Harvard Business Manager* are determined. These publications enlarge our data pool to a combined qualitative as well as a quantitative analyses. Both databases are searched for all existing articles including the string 'lead user' either in the body or headline. Our search includes all papers until the end of 2013 and reveals 223 papers from the WISO database and 44 articles from Statista. After removing duplicate articles, our data pool comprises 255 publications.

We subsequently code all publications regarding key identifiers concerning the publication (title, author(s), source, publishing year). In addition to this descriptive data, we read through all papers and tag the articles in regards to content information. The derived tags are reviewed and clustered in the categories: lead user characteristics, lead user cases, associated opportunities and risks, lead user typology, integration process, applied identification methods and lead user project team formation. Following these categories, we read through all papers tagging the content and derive a structured content overview. This research approach enables us to draw very detailed comparisons and analyze the understanding of user innovation within business press.

3.   Results

Lead user innovations have become more widespread within science and theoretical literature in the last decades (Fricke 2013; Hienerth, Lettl 2011; Franke et al. 2006). Nevertheless, the coverage and understanding in practitioners' magazines targeting decision makers is unclear, coherence between theory and praxis ambiguous. The first part of our analysis reveals the quantitative findings and represents a descriptive approach, whereas the second part focuses on the evaluation of the articles' subject matter and exhibits a content analysis.

3.1.   Descriptive results

The descriptive analysis contains the number of papers per year, the articles per magazine and the most active authors. To show the process of published articles in the analyzed business magazines the total number of **publications** per year was determined and is visualized in figure 2.

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[6] The number of 23 magazines with the highest editions was defined by Statista.
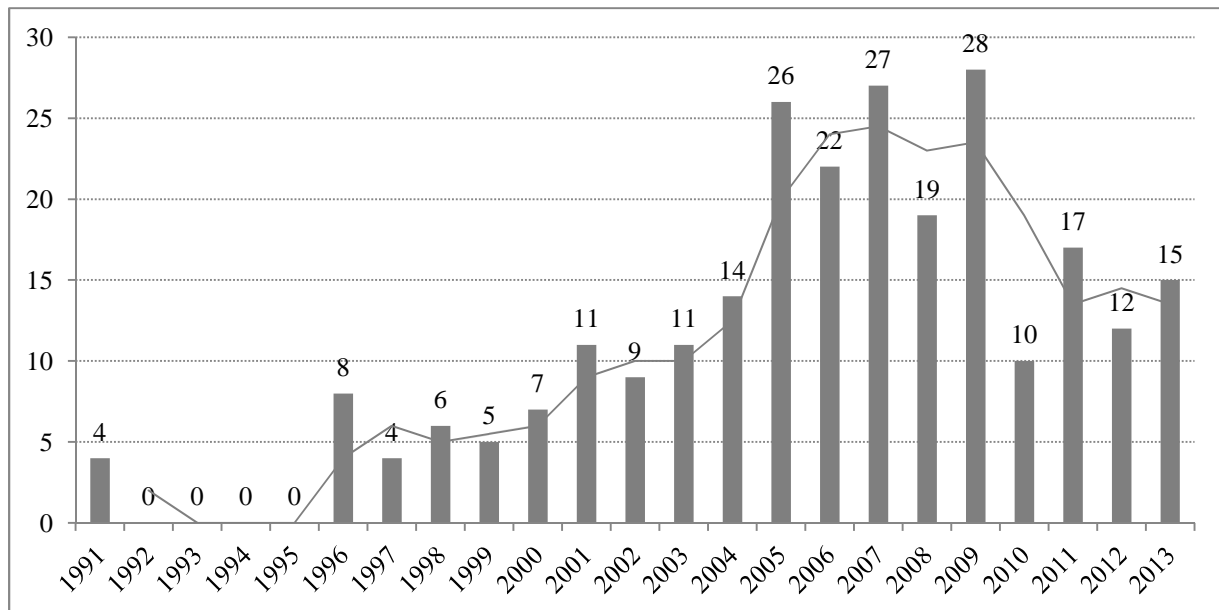
Figure 2: Number of papers per year

The first article published in business magazines including the term 'lead user' dates back to 1991. An increase in publications can be seen from 1996 to 2008, a peak is apparent within the duration from 2005 to 2009. Nearly half of the considered publications were written in this five year period (48%). The publication number has been declining since 2010 and has reached a current level almost equal to before the peak.

The top three **magazines** with the most publications are *Absatzwirtschaft* with a total number of 34 papers which is about 13% of the relevant articles, followed by *VDI nachrichten* and *Harvard Business Manager* (both 11 articles). We also check the results for influencing effects of the journal editions but find no effect[7]. We furthermore notice that the main magazines are not concentrating on one domain but cover various topics like marketing, industrial management, consulting, knowledge or technology management. However, some authors directly allocate the theme to a certain topic like Engelhardt and Freiling (1997) who signify the lead user approach to the sector of marketing (Engelhardt, Freiling 1997). A strong relationship between the lead user approach and marketing becomes also apparent when looking at the magazine with the most publications concerning lead users: Absatzwirtschaft. Absatzwirtschaft can be assigned to the sector of marketing, was the first magazine that adopted the theme, and published seven of the first ten articles (1991 till 1996).

Concerning the **authors** it has to be considered that we focus on German-speaking publications. Therefore international authors, especially von Hippel, are little present. However, von Hippel as the founder of the lead user phenomenon is cited in about every sixth article (38

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[7] Edition Absatzwirtschaft: 29.737 monthly, quarterly about 90.000; Edition VDI nachrichten: 155.915 quarterly.

articles). Although we analyze publications in practitioners" magazines, the articles are most often written or referred to scientists. The most frequent authors are German leading scientists in the sector of innovation management: Franke (9 articles), Bartl (7), Piller (7), Herstatt (7), Enkel (6), Füller (6), Lettl (4) and Gassmann (4). Lang (Webasto, 7 articles) and Steffes (CargoLifter, 5) are practitioners who appear repeatedly as authors.

3.2.   Content analysis

We subsequently analyze the articles' content in order to gain a thorough understanding regarding author affiliation, cases, lead user typology and characteristics, applied process, involvement opportunities and risks, and team formation.

Author affiliation

The second level of this analysis focuses on the papers' content und qualitative results. We see that some articles explain the lead user approach in detail, but several publications only mention it. They give reference to the topic or link it to a certain subject area, for example, *"the lead-user concept is prominent in the field of innovation management,..."* (Gruber 2004, p. 179). We find out that 59% (n=151) of the articles only mention lead users casually whereas 41% (n=104) explain the approach in detail. Thereafter, nearly 3 out of 5 articles containing the term 'lead user' do not focus on them or their explanation. When we focus on the 104 articles, we identify a relationship between a detailed definition of lead users and the involvement of experts. In case an expert is involved, the lead user approach is explained in detail in 80 of 104 cases (77%).

Cases

Our literature review identifies more than 40 different cases which describe the integration of lead users into management practice in detail[8]. This includes frequently mentioned cases in the field of (extreme) sports (Schäfer 2009; Maurer 2007; von Hippel 2005; Steinle 2005; Füller et al. 2003) and household equipment like the dishwasher, Tip Ex or coffee filters (Pätzmann 2003; Herstatt et al. 2002). Also well known firm examples including 3M, Hilti and Johnson & Johnson (Wilkes 2012; Bilgram, Jawecki 2011; Schäfer 2009; Piller, Reichwald 2006) are frequently stated. Figure 3 shows the diffusion of 40 exemplary cases concerning the company size (number of employees) and industry.

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[8] In addition, over 200 further cases are mentioned, referring to lead users, but without descriptions.
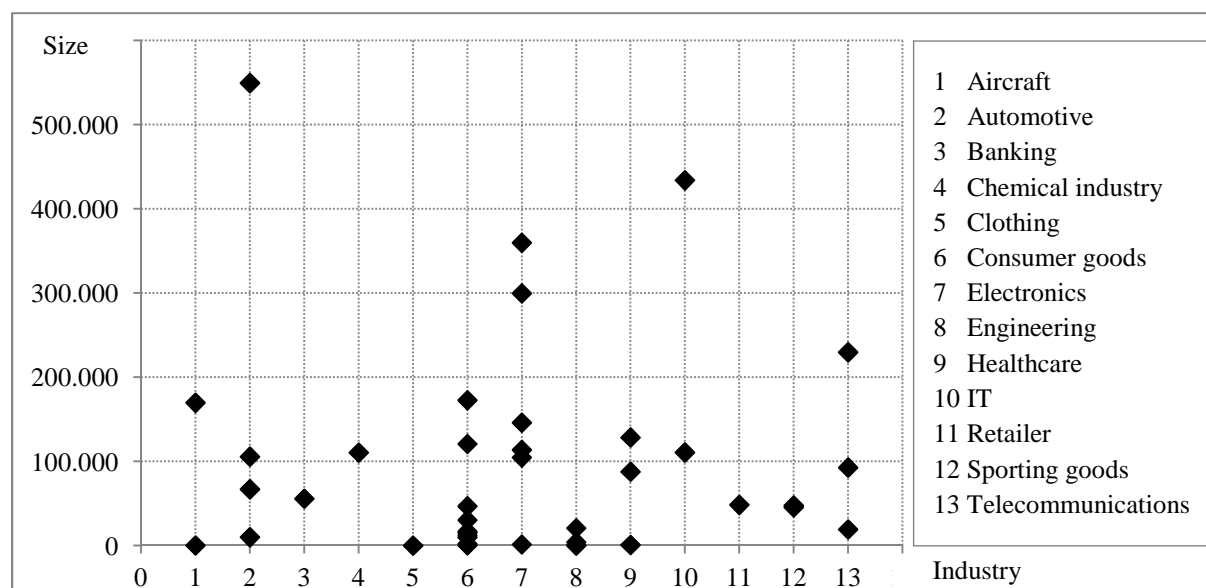
Figure 3: Industry and size of exemplary cases

Beyond the classical examples, our review discovers new cases of successful lead user integrations which are not common in scientific research. Table 2 highlights some examples of German companies.

Table 2: Specific cases of lead user integration[9]

Company	Size	Branch	Lead user product
Webasto AG	10.000	Automotive supplier	Coolant systems, car roofs
Weidmüller Interface GmbH	4.400	Energy, signaling, data	Electronic joining techniques
Coppenrath & Wiese GmbH	2.200	Food, bakery products	'Für dich! Kuchen' (cake)
Schurter Holding AG	1.600	Electronics	Appliance switches, fuses
Wintersteiger AG	850	Machine manufacturer in ski branch	Ideas for ski simulator, grinding machine
Peter Huber Kältemaschinenbau GmbH	250	Chiller construction	Tempering units

These cases show the integration of lead users beyond well known iconic examples, across all industries, and firm sizes. Even smaller companies can integrate lead users successfully and benefit from their creativity and knowledge. We furthermore identify that lead users are integrated in the development process of producer as well as consumer goods.

Characteristics

The characteristics of lead users are clearly defined and diffused in theory (Wagner, Piller 2011; Franke et al. 2006; von Hippel 2005): Lead users face needs before the mainstream market and benefit from using the products (von Hippel 1986). However, the understanding in

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[9] The data are extracted from the companies' actual websites.

praxis is unclear. In order to identify inconsistencies and variances of the understanding of lead users, we compare the established characteristics of lead users from academic journals to the understanding in business magazines. 104 of 255 papers explain lead user characteristics. These 104 articles often use von Hippel's characteristics and generally refer to him, particularly if von Hippel himself or other scientists are involved (Dauchert et al. 2013; Fösken 2009; von Hippel 2005). Nevertheless, some authors understand lead users differently or even add characteristics. We extract the twelve most frequently named characteristics from the 104 explaining articles. In order to classify them, table 3 relates these characteristics to three categories: two related to von Hippel's definition, and one collecting additional characteristics from praxis.

Table 3: Characteristics[10]* of lead users according to the business articles

Awareness of future market needs (von Hippel)	User's benefit from innovation (von Hippel)	Further characteristics from praxis
Advanced	Ambitious	Smart
Innovative		Special
Anticipatory		Techniques-affine
		Important /valuable
		Intensive
		Creative
		Experienced
		Opinion forming

The most frequently used characteristics for lead users in business magazines are 'innovative' and 'advanced' (9 and 8 times mentioned), similarly as defined by von Hippel (von Hippel 1986). Beyond these connotations, further rather unusual characteristics shows the category 'Further characteristics from praxis'. These range from problem solving capabilities (creative, smart), to normative statements (important, valuable), to vague expressions (special, intensiv). Although these connotations indicate a rather constructive perception of lead users in regards to innovation, some characteristics relate from an academic point of view to further consumer types. E.g. opinion forming (Kaps et al. 2011) seems equivalent to 'opinion leadership', but is distinguished within theory (Kratzer, Lettl 2009). Some authors also develop the definition further and reach out to adjacent research field, e.g. user entrepreneurship (Fust et al. 2011). Table 4 shows further examples of a deviating understanding.

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[10] Translated, the German denotations are: Fortschrittlich, innovativ, vorauseilend, anspruchsvoll, gewitzt, speziell, technikbegeistert, wichtig/wertvoll, intensiv, kreativ, erfahren, meinungsbildend.

Table 4: Differences in the understanding between theory and praxis

Author	Understanding of lead users
Dauchert et al. 2013	**Public authority** is generally the first innovation's consumer
Dammer 2008	Lead users are firms that have a very distinctive stage of development regarding their **multi project management**
Friggemann 2007	Lead user is a **Sparkasse-agency (First Mover)** which offered a new credit applications
Gromball 2007	Lead users are those consumers who **essentially form the market**
Schögel et al. 2005	**Communities** are lead users and opinion former
Günther 2002	Retailer who take part in a project **concerning the maximization of press-sales**
Steffes, Lutz 2000	Up to 30 major enterprises obligated themselves to **offer CargoLifter capacities** to develop the transportation airship

These examples underscore the inconsistent taxonomy of lead users in praxis. Firms use the term 'lead user' as they understand it and assign correspondent characteristics. An extreme example represents the case of CargoLifter, a large but unfortunately unsuccessful project. CargoLifter worked together with several supplier firms and called them lead users - a practice differing from the established description (Schwarzburger 2001). Nevertheless, this project was strongly promoted and extensively communicated, including the divergent 'lead user' practice and consequently a misleading lead user association (Piontek 2001).

Typology

Within business publications lead users are often named differently and certain denotations are assigned. Table 5 shows an overview and reveals both frequently and less frequently assigned denotations.

Table 5: Denotations[11]* of lead users

Named once	Named often (2-5)	Named most frequently (>5)
Extreme user	Pioneer user	Trendsetter
First mover	Elite / experts	Trend leaders
Trust user	Early user	
Reference user	Leading user	
Lateral thinker	Key user	
Heavy user		
Hobbyist / inventor		
Impulse generator		
Problem customer		

[11] Translated if in German language, the German denotations are: Extremanwender, Vertrauenskunde, Referenzkunde, Querdenker, Vielnutzer, Bastler, Impulsgeber, Pionieranwender, Elite/Experten, frühe Anwender, Leitkunden, Schlüsselkunden, Trendführer.

It is unsure whether authors try to avoid repeating the term 'lead user' due to stylistic reasons or because the authors reassign different denotations. However, the applied 'synonyms' express different types of users and dilute the precise definition of lead users - at least from an established academic point of view.

Process

The process analysis describes the steps communicated within the business magazines to include lead users in the innovation process. We identify a core process which distinguishes between (I) a collective of users and (II) single lead user for sourcing dispersed knowledge.

(I)   Ideas come from a collective of users, for example through idea competitions. Lead users are identified who evaluate these ideas, generally in workshops, and generate concepts for innovations.

(II)   Lead users are identified at first, then they generate ideas themselves and evaluate them in order to create concepts.

Both streams meet in the next step 'idea evaluation', that is followed by 'concept creation'. Figure 4 illustrates the process.
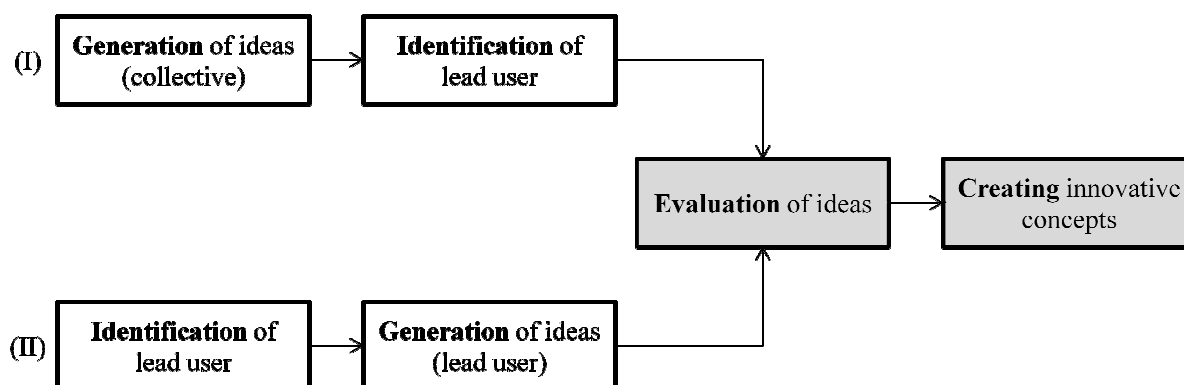

Figure 4: Core process of integrating lead users[12]

This concept is generally in line with the process defined in theory (Churchill et al. 2009; Lüthje, Herstatt 2004). Nevertheless, we see that firms manage the process slightly differently in detail. Some companies stick to a defined, systematic process very strictly (Bretschneider et al. 2011), other firms give rather recommendations for the process and support other approaches that arise from the collaboration with lead users (Junge 2011). Furthermore, we see that different forms of teams are created to evaluate ideas. Firms often combine lead users with employees aiming to benefit from external as well as internal knowledge. For example,

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[12] Own illustration based on the literature review's results.

Coppenrath & Wiese (s. 3.2.) allocates one employee of the firm to one lead user (Fösken 2009). Mammut integrates embedded lead users which are employees as well as lead users (Schweisfurth et al. 2013). A close collaboration between lead users and employees is generally seen as an essential factor to benefit from the lead users' knowledge most efficiently (Büchel, Armbruster 2006; Friemel 2005).

We identify further differences between theoreticians' and practitioners' understanding in the process regarding the process duration, number of integrated lead users, and identification of lead users.

Duration / repetition

The identified durations for lead user projects vary from 14 days to half a year (Willenbrock 2012; Ciupek 2008). The workshops, which are frequently used to integrate lead users, last for example half a day, two days or one weekend (Markus et al. 2013; Honsel 2007; Pätzmann 2003). We also discover one case where lead users have to solve tasks daily over several days in order to create ideas (Willenbrock 2012). Lead user projects are either conducted once or regularly. Companies like Hilti, Webasto or Weidmüller (s. 3.2.) frequently organize projects with lead users, the positive results strengthen the systematic repetition of lead user projects (Ciupek 2008; Piller; Reichwald 2006).

Number of lead users

There is a wide range concerning the number of involved lead users. Primarily they are invited to workshops. Sometimes six to ten lead users are involved, sometimes up to 30 or even more, e.g. assembled in an online-panel (Gieseking 2009; Koob, Schoegel 2008; Baeuchle 2006).

Identification of lead users

Classical approaches to identify lead users are screening and pyramiding (von Hippel et al. 2009; Pätzmann 2003). The literature analysis shows that firms apply further methods to identify lead users, especially utilizing online tools. Lead users are for example taken out of an online-database of 14.000 customers or are identified within an online-brainstorming comprising 150.000 people (Honsel 2007; Krempl 2007). Bleckmann Heating Systems established a customer advisory board which meets regularly. The company thereby benefits from the external knowledge and creativity, other firms which use such boards are Vattenfall, Deutsche Bahn and Commerzbank (Madel 2009). The research agency 'Sturm und Drang' uses

crowdsourcing and created a panel of 250 possible lead users they can involve to create ideas and evaluate products and services (Gieseking 2009).

Methods

We also analyze the business press for methods to integrate and find lead users. Table 6 summarizes the applied methods in regards to their frequency of occurrence within the analyzed articles.

Table 6: Various methods* connected to lead user innovation[13]

Named once	Named often (2-5)	Named most frequently (>5)
Customer-centricity-concept	Design thinking	Lead user method
Roadmaps	Crowdsourcing	Idea competition
Post-it-audit	Trendanalysing	Workshops
Future-houses	Broadcast search	Toolkits
Prototyping	Innovation competition	Online-/Idea-communities
Scenario-analysis	Focus groups	
Benchmarking	Mass customization	
SWOT-analysis	Co-creation	
Customer observatory	Conjoint-analysis	
Morphological analysis	Customer advisory board	
Netnography	Complaint-management	
Social Media Mining / Monitoring		
Co-innovation		
Expert-interviews		
Digital ethnography		
Hidden-needs-analysis		
Virtual communities		

The lead user method, idea competitions and communities, workshops and toolkits are named most frequently. They also represent methods for the integration of lead users common in scientific literature (Jeppesen 2005; Herstatt 2004; Lüthje 2003). Beyond these classical methods we identify a multitude of further methods to integrate lead users. Methods called 'Super Groups' (Coppenrath & Wiese) are company-owned methods, similar to the lead user method, but adopted to the firms' particular circumstances (Loudon 2011). Another recent example is the case of Philips' 'Home-Labs' in Eindhoven that analyzes lead users' behavior in order to derive ideas and trends (Koob, Schoegel 2008). A further example is Ideo. This firm

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[13] The once named methods are a selection and don't comprise all methods named within the analysis.

conducts 'Post-it-audits' whereby employee's memos are collected and used as a source for ideas for instruction books (Heuer 2005).

Our analysis also reveals the application of latest methods and trends like netnography, crowdsourcing, Social Media mining and monitoring of virtual communities (Bilgram et al. 2013; Petrovic et al. 2013). Diverse authors emphasize this upcoming trend in the last decade and consider these methods as very important and beneficial for the integration of lead users (Markus et al. 2013; Willhardt 2013; Gillies 2009; Fösken 2009). One publication strongly demand a more extensive adoption of IT-systems within the lead user workshops since the classical process is inefficient, slowly and do not lead to the desired results (Bretschneider et al. 2011).

Involved stakeholder and team formation

Lead user projects are often conducted in teams and team formation represents an essential success factor (Lüthje, Herstatt 2004). In contrast, our literature analysis reveals that several authors explain the lead user phenomenon, but their publications lack to mention team formation or even stating responsible corporate functions (Hering et al. 2011; Bilgram, Jawecki 2011; Madel 2009). Particularly, out of our 104 papers concentrating on lead users, 40% do not mention any insight on team formation or responsibility. If involved team members are mentioned, most frequently the projects are conducted with interdisciplinary teams as shown in figure 5. These teams consist in most cases of marketing and Research & Development experts, and to a lesser extend members of production and strategy (Ciupek 2008; Ernst 2004).
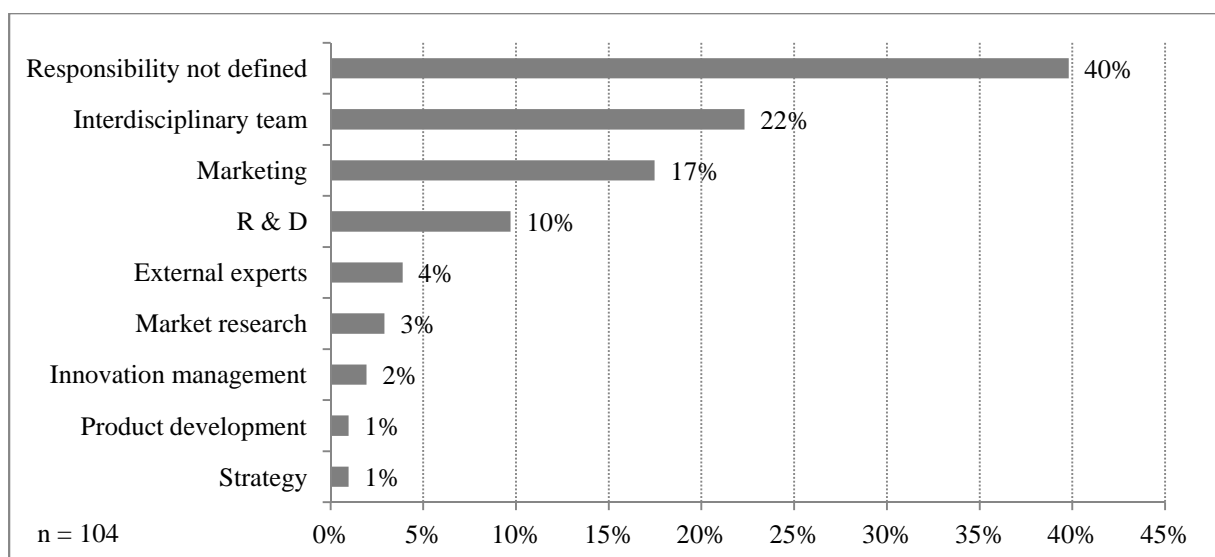

Figure 5: Responsible departments for lead users' involvement

It is remarkable that team insights are more frequently mentioned with the involvement of large and multinational firms. In contrast the responsibility and team formation is more often not defined if smaller companies are the main focus of the article. However, especially smaller companies frequently consult external partners like HYVE, Neonauten Consulting, or LEAD Innovation Management (Willenbrock 2012; Eckl-Dorna 2006). Also the community of Innocentive is appreciated (Tapscott, Williams 2007; Piller, Reichwald 2006).

Opportunities and risks

The involvement of lead users is attributed to certain opportunities for firms. However, our analysis also reveals doubts and risks associated with the involvement of lead users. Table 7 reveals the opportunities and risks described.

Table 7: Chances and risks of lead users

Chances	Risks
Distinctive customer focus	Identification very difficult
Skim off usable knowledge	Too much (not useful) ideas
Innovative ideas and concepts	Not representative for the market
Decrease of risk, higher credibility	High investment costs / time expenditures
Better fit of products	Lead users are seldom
Shorting of innovation process	Ideas are too radical and do not fit
Expression of constructive criticism	Undesired transfer of knowledge
Interaction between producer and user	Risk of getting copied
Reducing of cost and time	Resistance of experts inside the company
Acquisition of related branches	Other methods are not replaced

Based on the analyzed articles we reveal that lead users are mostly associated in order to decrease the risk of a product launch. They are integrated because of their distinctive customer focus and a corresponding expected higher fit of the product according to the customer's needs (Wilkes 2012; Fust et al. 2011). However, it is an important challenge in praxis to identify lead users as they are scarce and hard to find (Friemel 2005).

4. Discussion

Within the following chapter we will discuss the previous results of the analysis and derive propositions. We will focus on the aspects of the lead users' understanding, application in praxis, lead user domain and impact as well as the knowledge diffusion between academia and praxis.

Lead user diffusion

This review aims to give an structured overview of the lead user approach in praxis. Up to now, the diffusion of the lead user approach in business circles is unclear. Our results are derived from 255 publications covering the term 'lead user' in the German-speaking business press. Whereas some of them only give reference to the term, 104 articles explain the phenomenon in detail. Besides the number of articles as approximation for topic spread we also reveal the existence of over 200 different cases being associated with lead users and mentioned in the articles. As of these examples, in 40 cases the integration of lead users is presented in detail. These cases show the integration of lead users beyond well known iconic examples (e.g. 3M, Johnson & Johnson, Hilti), across all industries, and firm sizes (also smaller companies from rather specific branches integrate lead users, e.g. Webasto AG, Peter Huber Kältemaschinenbau GmbH). We also found evidence, that small firms can overcome their limited resources and are able integrate lead users. In order to mitigate their structural drawbacks, they draw on intermediaries and consulting firms to conduct lead user projects. Considering that only a few firms communicate their development methods, we assume that far more lead user cases exist, especially if we include very similar methods that are not named lead users. Based on these observation we propose:

Proposition 1:   *The theme lead user innovation is diffused in praxis.*

Proposition 2:   *The successful integration of lead users is not limited to a specific industry or company size.*

Lead user understanding

104 papers describe in detail the characteristics of lead users. The terminology consists of definition based on von Hippel as well as expression like advanced, anticipatory, ambitious, important, smart or valuable as shown in the characteristics section. Within the typology analysis the most frequently stated denotations of lead users are 'trendsetter' or 'trend leader' followed by further attributes like 'pioneer user', 'experts' or 'early user'. Nevertheless, even if lead users are most frequently (13 times) called 'trendsetter' in business magazines, from a theory point of view they do not necessarily have to be (Bretschneider et al. 2011). Also, they are not implicitly persons who use products for the first time as pioneer users in order to evaluate or test them. *"Lead users are not 'innovative customers', 'pilot customers' or 'beta users' who use an offer for the first time, maybe before the market launch, or improve products together with the manufacturer. Lead users give the impulse for a functional new innovation, long time before it's developed or introduced to the market*"* (Wagner, Piller 2011, pp. 8-9).

However, denotations like 'lateral thinker' also exhibit that lead users are seen as different from the mass (Gillies 2006). Lead users are moreover described as 'problem raising customers' (Eckl-Dorna 2006). They develop ideas for solutions since they face a problem existing products cannot solve. Thus, the understanding of lead users in business press builds on the definition by von Hippel. However, practitioners and companies understand the term 'lead user' in a broad sense. They add characteristics and come up with modified definitions of lead users. They attribute traits and capabilities, different than the academic understanding. We therefore propose:

Proposition 3:   There is no consistent understanding between theory and praxis regarding the term 'lead user'.

Lead user application in praxis

The integration of lead users is described with the lead user approach from a theoretical viewpoint. Our analysis reveals that within firms the core process of integrating lead users is very similar to the academic approach. Differences exist as firms adopt the practices to their particular circumstances and trends. The most frequently named challenge is the difficulty of identifying lead users. To mitigate this challenge firms apply latest methods like netnography, social media monitoring and enhance classical methods like pyramiding and screening. Based on these observations, we propose:

Proposition 4:   The identification and integration process of lead users follows the theoretical approach but considers latest developments.

Lead user domain

The literature analysis has shown that the theme lead user innovation has become a frequent topic in business press whereby the identified magazines comprise a wide range of domains like general management, marketing, or R&D. Most publications are identified within the realm of marketing, but not limited to. Also, our analysis of team formation points to different stakeholders and indicates an interdisciplinary approach. Interestingly, we only find very limited comments in regards to lead user project responsibility. It might be a barrier for firms to start a project with lead users if they do not even know who is responsible inside the firm. Based on these insights, we propose:

Proposition 5:   The theme lead user innovation is an interdisciplinary topic impacting and building on various functions.

Lead user impact

We reveal several opportunities and potential risks discussed within the business press. The opportunities include the definition of *"profiles of evolving markets and transfer this to marketing strategies*"* (Monsees 2009, p. 28), *"minimization of the risk, an increase of partnership as well as an improved comprehension of the market*"* (Judt, Klausegger 2009, p. 46) or to *"collaborate on an innovative solution for the market"* (Freiling 2008, p. 41). On the contrary, the most frequently named concern are that lead users are too difficult to identify and - if they are integrated - an undesired loss of knowledge might occur (Enkel 2011; Schreiber 2007). Other statements relate to the resistance of companies or individual employees against the integration of lead users: *"The systematical orientation to outside ideas is a quite new concept. Therefore it's normal that some managers say: We have never done this before!*"* (Salvenmoser 2009). In addition, we found cases that highlight the missed opportunities for firms to identify early market signals with lead users. An example represents the case of the so called 'Twin-Tip-Skis', a particular bowed type of skis to increase the opportunity to perform tricks. The need for this particular ski type was expressed in several online communities, but firms did not realize the potential (Markus et al. 2013). The analysis of Online-Communities, e.g. via Web or Social Media Monitoring, could have exposed this opportunity for innovations. Based on these findings we propose:

Proposition 6:   *Firms are aware of fundamental challenges and opportunities of integrating lead users but have to integrate them more systematically.*

Knowledge diffusion between academia and praxis

Our analysis reveals a significant publication activity of scientists in the business press. Scientists represent the most active authors. Besides this quantitative aspects, publications with scientist more frequently discuss lead user characteristics and include details definitions - often referring to the academic terminology. These findings implies important implications, as authors with strong scientific background bridge their academic understanding into praxis and diffuse scientific insights. Based on these observations we propose:

Proposition 7:   *German-speaking scientists contribute to knowledge transfer and publish in practitioners' magazines.*

Proposition 8:   *Integration of scientist leads to a more precise description of lead users analogue to the academic definition.*

5. Implications for theory and praxis

Our analyses exposes the diffusion and implementation practices of lead users in firms, derived from business magazines targeting employees and corporate decision makers. It enables us to understand in more detail the adoption of the theoretical approach, and in turn to determine differences between the approach in theory and praxis. Nearly 30 years after the theoretical emergence of the phenomenon, our results show that lead users are a topic in the business press. However, we discover inconsistencies in the understanding. Practitioners expand the term and apply them broadly also in regards to 'opinion leader', 'trendsetter', and 'experts'. Thus, a clear communication is needed in order to develop a common precise understanding, sharpen the special qualifications of lead users, including what lead users are not per se. This inconsistencies between theory and praxis could also indicate an evolution of the concept. User entrepreneurs and embedded lead users are recent concepts in academic publications, however, maybe praxis has even further progressed? Since the circumstances in business life gradually diversify, the approach should furthermore be adapted to the changing environment (e.g. changing market situations, new channels, technological development). Developments like the fundamental growth of the Internet over the past years should be included and older processes advanced. This becomes especially obvious in cases like the Twin-Tip-Skis, where several firms missed the opportunity to integrate lead users, although they were apparent and comparatively easy to integrate (Markus et al. 2013). These new opportunities can be adopted to existing processes to combine emerging, promising new methods and foster harnessing of distributed innovation sources.

Our analysis has also important implications for firms. In order to benefit from the meaningful, potentially path breaking suggestions lead users are capable of giving to companies, firms should be more open to the lead user approach and use it more systematically. Positive examples of successfully integrated lead users highlight the benefits and potential of this approach. Companies should be susceptive to the new ideas and suggestions although they are not developed inside the company. To benefit from experiences and to avoid previous problems, firms can collaborate with experienced scientists or intermediaries. From their own experience they can give recommendations in order to avoid problems and faults they already made. Especially scientists apply the lead user approach in a narrow sense - as discussed in theory - and help avoiding misleading expectations from lead users. Table 8 summarizes our recommendations.

Table 8: Implications for theory and praxis

Theory	Praxis	Both
Clear, consistent definition and explanation when consulting practitioners and firms	More integration of lead users and openness to this method	Improvement of the transfer of knowledge between theory and praxis
Adjust the theoretical approach to current circumstances as well as changing in praxis	Collaboration with experts and proved companies	Adoption of trends and developments

Limitations and future research directions

Our analyses follows an thorough method, but certain limitations exist. First, we concentrate on the German-speaking business press and ignore publications from outside this area. However, we believe that Germany is an adequate exemplary area as it represents an area where ample theoretical research meets numerous innovative firms, at least, it reveals a glimpse on the diffusion and adoption of the lead user phenomenon in a highly developed country.

Second, our literature analysis applies the search string 'lead user'. Thus, includes false positives search results, but do not find synonyms of 'lead users'. We also analyze the articles from an qualitative point of view and gained a deep insight into praxis, but we cannot derive quantitative findings in terms of the number of firms that apply the lead user approach. Analyzing this diffusion of lead user implementation in praxis exhibits an avenue for further research. In addition, we derive certain propositions that stimulate future research and enhance our understanding of knowledge transfer, creating coherence of the phenomenon, and advance our approach to integrate lead users. Moreover, certain questions remain unanswered. Team formation is interdisciplinary, but which department actually drives open and user innovation? Why are lead users not stronger anchored in business practice and how can the associated risks be mitigated? What are barriers for user innovation and how can management foster the integration of lead users? What about interaction between diverse stakeholders with different objectives and lead user behavior?

6. Conclusions

We raised the question whether lead user innovation has arrived in praxis after 30 years of theoretical research. We show the diffusion of lead users and discover numerous cases in different industries and independent of firm sizes. We reveal the adaptation of the lead user approach in praxis and point to inconsistencies between theory and praxis in view of a coherent understanding. These findings build the fundament for an update of the lead user approach and future research. Thereby, ample opportunities exist, especially in view of cross-fertilization and collaboration between theory and praxis.

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