

How Embedded Lead Users Contribute to Innovation Processes: A Systematic Literature Review and Conceptual Framework

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Abstract

Embedded lead users (ELUs) are company employees who are also users of the company products, most often holding this role due to their active participation in the user domain in their spare time. ELUs are able to integrate knowledge of customer needs in the innovation process based on their social contacts, user experiences, and knowledge of the innovating network or organization, for example. Due to this ability, ELUs can facilitate innovation processes. The aim of this systematic literature review is to *examine how ELUs can contribute to different stages of the company innovation process*. The literature used in the review consisted of peer reviewed academic journals and conference proceedings after the year 2000. Broader literature of external lead user collaboration was not included, as the focus was on narrower discussion of embedded lead users. Three research questions are answered to form a conceptual synthesis of ELU literature 1) What kind of resources can ELUs offer for the innovation process? 2) How and based on which resources do ELUs contribute to the different stages of the innovation process (opportunity identification and idea formation, design and development, and testing and launching)? 3) What kinds of roles do ELUs have and how does their dual role in the user domain and the company influence the innovation process? Findings of the study bring new managerial perspectives on how companies can utilize ELUs in their innovation practices. In addition, by forming a holistic conceptual framework of current ELU research and the role of ELUs in the innovation process, this paper offers a variety of theoretical contributions and ground for future studies.

Keywords: Embedded Lead User, User Involvement, Collaborative Innovation, Innovation Management, Innovation Resources.

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1 Introduction

Collaborative innovation approach involves combining knowledge, technologies, and other resources across organizational boundaries (Keinz et al., 2012; Bruns, 2013; Jensen et al., 2014). The importance of user involvement in the innovation process has long been stressed in innovation management and research (Lehnen et al., 2016; Hiennerth and Lettl, 2017), and related literature proposes a number of different methods and approaches for companies to obtain information on user needs in the innovation process (Wadell et al., 2013; Shah and Robinson, 2007).

Embedded lead users (ELUs) are firm employees who are also users of the firm's products. They are defined as individuals who have strong affiliations to the company and are on the payroll

or receive steady monetary compensation from the company due to their continued participation in the company innovation process - but are at the same time also very well connected to the user domain (Wadell et al., 2013; Schweisfurth and Herstatt, 2016). An ELU could be, for example, a professional mountain climber, who is still very actively involved with the sports community and works for a mountaineering equipment manufacturer.

Having social ties to the user community, ELUs can engage in informal conversations with other users about the company product features and receive real-life feedback. ELUs can also follow competitors' products and give feedback on how the user community reacts to them, thus offering suggestions to the company on how to possibly outrun the competition. In an interview by Euchner (2013), Eric Von Hippel commented that companies should hire ELUs because they know the user communities companies are interested in and know how to work with them to facilitate innovation processes.

Because ELUs know their workplace, they are also able to effectively integrate their knowledge of customer needs with company-embedded technical knowledge. In addition, ELUs can be valuable facilitators in innovation processes (Schweisfurth and Herstatt, 2016), especially if they are intrinsically driven to do so (Ghasemzadeh et al., 2021). Indeed, the difference between ordinary lead users and ELUs is that the latter are embedded in two domains: in the user domain and inside the organization. In that role, they can be more active than regular employees (or actors external to the organization) in acquiring, disseminating, and utilizing information for innovation (Schweisfurth and Raasch, 2015). In addition, due to their domain-specific innovativeness, user knowledge and social ties in the user community, ELUs not only facilitate innovation processes, but also shape and influence product diffusion inside their social networks as opinion leaders (Schweisfurth and Herstatt, 2015).

Due to their extreme intensity of use, ELUs place high demands on products, and as a result they often experience dissatisfaction with existing ones, which can indeed motivate them in the search for better solutions. ELUs can be good at detecting their own needs and translating them into specifications understood by product developers (Faullant et al., 2012), even in very challenging situations (Mahr et al., 2012).

Although research on external lead users' participation in innovation processes has been ongoing since the 1980s (see, e.g., von Hippel, 1986; Kaulio, 1998; Coyne, 2000; Dehne, 2003; Kristensson, Gustafsson and Archer, 2004; Intrachooto, 2004; Lüthje, 2004; Enkel et al., 2005; Hienerth and Poetz, 2005; Lehnen et al., 2016; and Hienerth and Lettl, 2017) research focusing on ELUs is fairly new and has elicited interest from scholars for not much longer than 10 years (see, e.g., Wadell et al., 2013; Schweisfurth and Raasch, 2015, 2020; Schweisfurth and Herstatt, 2015, 2016; Schweisfurth, 2017; Schmidt-Keilich and Schrader, 2019; Ghasemzadeh et al., 2021). Due to the scarcity of research and recognized increasing managerial need to better understand how to involve ELUs in the innovation process, the aim of this systematic literature review is to *examine how, according to the existing literature, ELUs can contribute to the three different stages of the company innovation process: 1) opportunity identification and idea formation, 2) design and development and 3) testing and launching* (Bosch-Sijtsema and Bosch, 2015; Fuller et al., 2006).

To achieve this goal, three research questions were formed:

RQ 1: What kind of resources can ELUs offer for the innovation process?

RQ 2: How and based on which resources do ELUs contribute to the different stages of the innovation process?

RQ 3: What kinds of roles do ELUs have and how does their dual role in the user domain and in the company influence the innovation process?

The managerial implications of the study bring new perspective on how companies can utilize ELU resources in their innovation practices. In addition, by forming a conceptual framework of current ELU research, this paper offers a theoretical contribution by creating a more solid ground for future research in the area.

In the following, a systematic literature review and the related research methodology are first described. The results are then presented, followed by conclusions.

2 Systematic Literature Review

To answer the research questions presented above, this study uses systematic literature review as a method to methodically collect and examine studies related to ELUs and their involvement in the innovation process. This means evaluating and interpreting available literary sources relevant to this particular research question and topic area. Traditional literature reviews are often biased, but by using trustworthy and structured methodology and precise screening methods with a review protocol, we aim to present a fair evaluation of a research topic and give scientific value (Kitchenham and Charters, 2007; Petticrew and Roberts, 2006). As an output, we were able to produce a synthesis of existing ELU literature in the form of a conceptual framework (see Figure 1) of the “state of the art” research of ELUs and consequently define possibilities for future research to strengthen the so far scarce discussion of ELUs (Gough, Thomas and Oliver, 2012).

The systematic review protocol is shown in Figure 1. First, the planning stage of the review was carried out (e.g., Kitchenham and Charters, 2007). Search strings were formalized, and databases were chosen to obtain comprehensive understanding of ELU literature. After that, the inclusion and exclusion criteria were generated, and pilot searches were conducted. The new pilot search terminology was then entered into the search string, which was refined based on the testing and piloting searches.

The academic databases chosen for the automated search were Scopus, ProQuest, Ebsco and Science Direct. The search string was generated using central terminology gathered from the title of the study and the synonyms formed from the key words related to the research. The main key words used were “embedded lead user” or “internal lead user” or incorporated lead user”. Also “user involvement” or “organization design” together with “embedded lead user” formed the best results. The final search string was: “embedded lead user*” OR “internal lead user*” OR “incorporated lead user*” AND “user innovation*” OR “user contribution*” OR “user collaboration*” AND “embedded lead user*” OR “internal lead user*” OR “user innovation*” OR “innovation management*” OR “organization design*” AND “embedded lead user*” OR “internal lead user*” OR “user innovation*” OR “B2Cmarket*”.

The inclusion and exclusion criteria were formed to ensure that relevant research related to ELUs and organizational studies related to ELU involvement was gathered. The inclusion criteria consisted of peer reviewed academic journals and conference proceedings in English. Studies were evaluated based on the title, abstract and keywords. Additionally, the articles were roughly categorized based on their contribution. The articles were then further evaluated using the full text, after which the final set of studies were gathered.

The timeline for the first automated search was selected from 2010 to 2020, but that was further complemented with a manual search to guarantee the relevance of the data. Manual search means that reference lists of articles found in the automated search were reviewed to find more relevant and interesting articles. For example, Hauschildt and Schewe, 2000; Shah and Robinson, 2007 and Hyysalo, 2009 were found in the manual search, widening out the timeline of relevant articles to 2000-2020. In addition, while preparing the manuscript for publication, manual

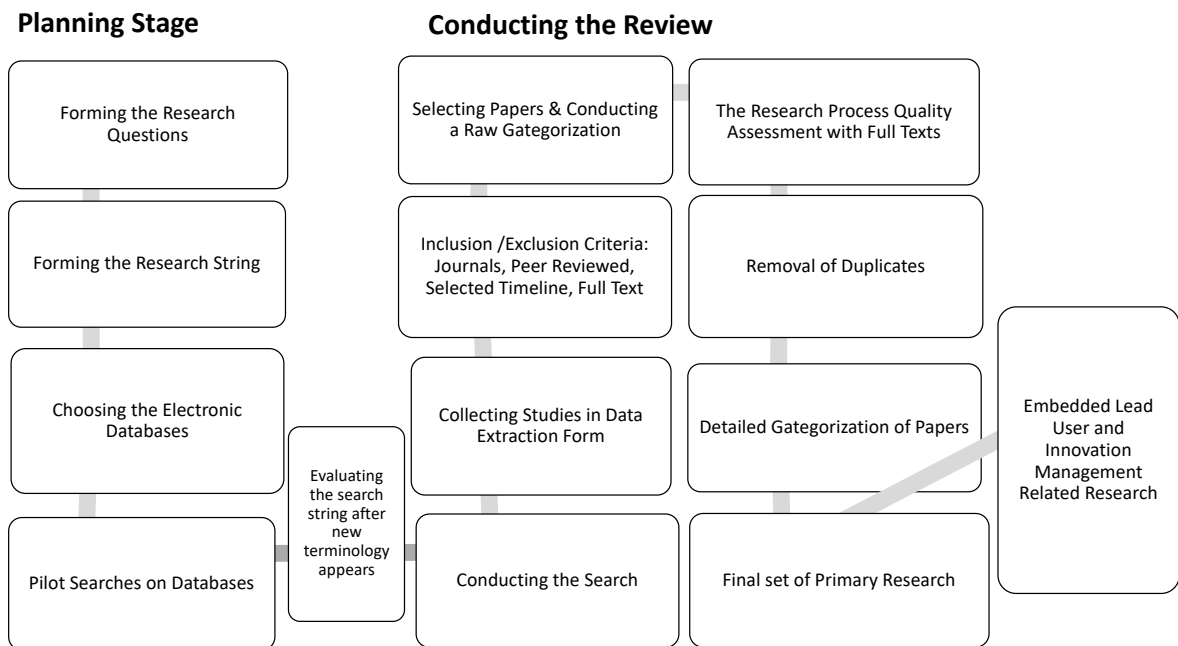


Figure 1. A systematic literature review protocol (adapted from Kitchenham and Charters, 2007).

searches were conducted to check if new articles in the area had been published. One relevant article meeting the inclusion criteria was found, regarding the entrepreneurial orientation of ELU (Ghasemzadeh et al. 2021), and was added and analyzed. Literature on external lead users and related collaboration were excluded from the analysis, thus, the focus was on literature relevant from the ELU discussion point of view. This explains why the number of relevant references is relatively low.

In total, the search process found 148 results, and after the subsequent inclusion/exclusion analysis, generated a group of 48 studies. After an additional exclusion round on full texts and relevance to the ELU research, 20 articles were finally selected (see attached listing of 21 articles, including one updated article from year 2021). This result indicates ELU-related research is a relatively new and so far under-researched area. This realization was taken into consideration at the beginning of the research process, and it served as the motivator for conducting this study.

The analysis process was abductive by nature, with the aim of categorizing and describing concepts relevant to the topic (ELUs in innovation processes), as well as relationships between those concepts. The objective of the synthesis is to provide an overview of the literature in the field in question (Gough, Thomas and Oliver, 2012; Petticrew and Roberts, 2006). Considering the low number of articles forming the data, conducting such an analysis was quite economical. First, our aim was to form a holistic picture of what the discussion included in general. We soon noticed that the focus has been on ELU resources, the role of those resources in the innovation process and in the ELU dual role. This led us to form more detailed research questions to guide the formation of the final synthesis, the conceptual framework, which is presented in the following section.

3 Results - a conceptual framework of ELU discussion

In this section, the research questions are answered to examine how, based on systematic literature review, ELUs contribute to the three different stages of company innovation processes. First, the resources general-level ELUs can offer to the innovation process are defined as an answer to the first question. Intellectual and social resources as “umbrella concepts” for varied resources are recognized. Second, those resources, their detailed nature, and their importance in different stages of the innovation process are defined to answer the second question (how and based on which resources do ELUs contribute to the different stages of the innovation process: idea formation, design and development and testing and launching). Finally, the third research question related to ELU roles and influence of their dual role is answered.

RQ 1: What kind of resources can ELUs offer for the innovation process?

Intellectual resources

ELUs build on their intellectual resources that can be further categorized into 1) use knowledge, 2) solution knowledge and 3) process knowledge. As mentioned, the first and most evident ELU resource is knowledge based on their own use experience (*use knowledge*). When making modifications to existing products and carrying out practical repairs, ELUs rely on their technical knowledge (*solution knowledge*), for example, when they sketch or prototype and put their ideas into practice. An illustrative example of such an activity would be a river kayaker modifying or building kayaks by hand or mountain biker who plans to fix their bicycle to make it more suitable for stunts (Hyyalo 2009; Schweisfurth and Herstatt, 2016). ELUs also use their procedural knowledge, meaning knowledge related to *organization processes* (*process knowledge*). For example, because they understand how the innovation process works in a company, ELUs tend to know which ideas fit and what the boundaries of feasibility exist in that specific context (Schweisfurth, 2017). Personal beliefs and motivation are intrinsic in utilizing ELUs' personal resources. According to Ghasemzadeh et al. (2021), ELUs' entrepreneurial self-efficacy in the form of intrinsic motivation and passion to be involved in the innovation process can remarkably stimulate their participation.

Social resources

ELUs also deploy social resources in the form of 1) structural, 2) relational, and 3) cognitive resources. A distinct characteristic of ELUs is that they can link the corporate R&D world with the user world and consequently deploy their *structural resources* by having access to user networks due to their social contacts in the user domain. This can give ELUs a higher level of credibility within the company, too, as they can provide a genuine user perspective (*relational resources*) (Schweisfurth and Herstatt, 2016). ELUs can also re-enact the needs of other users and understand how customers benefit from innovative solutions to their occurring problems (*cognitive resources/cognitive empathy*) (Schweisfurth and Herstatt, 2015). ELUs' dual embeddedness can shape their cognitive structure in a way that enables them to understand early signals from users and translate them into innovative solutions (Schweisfurth and Raasch, 2015).

RQ 2: How and based on which resources do ELUs contribute to the different stages of the innovation process?

Idea formation

During the idea formation stage, ELUs deploy their intellectual resources (user knowledge, solution knowledge and process knowledge) to produce innovative ideas based on their own use experience

that fits the company's technical and commercial needs (Schweisfurth and Herstatt, 2016; Schweisfurth and Raasch, 2015). ELUs also deploy structural, relational, and cognitive resources (cognitive empathy) as they absorb, acquire, and share valuable user information with their colleagues (Schweisfurth and Herstatt, 2016; Schweisfurth and Herstatt, 2015; Schmidt-Keilich and Schrader, 2019).

Internal idea generation and promotion. ELUs generate new ideas by participating in ideation among company employees during informal conversations among R&D personnel and in ideation workshops (Schweisfurth and Herstatt, 2016), for example. Wadell et al. (2013) also find that ELUs can act as “identifiers of opportunities”. For example, when a new idea for a solution emerges and ELUs think they could resolve it, they become important promoters of the idea and make sure that the idea reaches all the right people in the organization, especially in R&D. Although ELUs are socialized by the firm, exposed to corporate culture, rules and rigidities which may potentially also hinder their innovativeness, their ideas are easier to realize within the firm than those from external lead users (Schweisfurth and Raasch, 2015).

External networking. In addition to promoting innovation internally in organizations, ELUs play an important net weaver role during the ideation phase, connecting the internal organization with the user domain (Schmidt-Keilich and Schrader, 2019). ELUs acquire information in informal ways (practical discussions with colleagues related to company products) and formal ways (conferences, exhibitions) and use their extensive commercial and non-commercial networks (Wadell et al., 2013) to get that knowledge.

External information absorption. ELUs benefit from dual embeddedness in the user and innovator domain, because it enables them better to absorb sticky knowledge from the user domain (Schweisfurth and Herstatt, 2015). In their research on gaming hardware companies, Schweisfurth and Herstatt (2016) found that ELUs acquired crucial tacit knowledge from the user domain during their use experience while gaming with their friends. Exchanging ideas while playing, ELUs were able to ask questions and receive feedback from the gamers and extract valuable tacit knowledge of the gaming experience. Obtaining this sort of sticky customer knowledge is not easy using traditional methods (Heiskanen, Hyysalo, Kotro and Repo, 2010).

Competitive intelligence. By testing competitors' products, ELUs produce valuable user feedback for the idea formation stage. Facing problems during use of the competitor's products, for example, ELUs are able to provide new ideas for improvements (Schweisfurth and Herstatt, 2016).

Development stage

Throughout the development stage, ELUs deploy intellectual resources (user knowledge, solution knowledge, process knowledge) to find solutions to emerging problems, offering ideas for new functions or features, and helping the company to design new products (Schweisfurth and Herstatt, 2016). Social resources enable them to utilize customer feedback from the user domain and transform it into company language and into engineering specifications for consequent product development. Combining market knowledge with technical knowledge, ELUs actively participate in IWB (innovative work behavior) (Schweisfurth and Raasch, 2020). Having a close, informal relationship with R&D also helps tear down information barriers and builds networks inside the firm (Brives et al., 2020).

Product testing. ELUs can help in testing company products and usually test products informally in their leisure time. They can give feedback based on their use experience and engage in dialogue with innovators about the functionalities, possible shortfalls or use-related problems, and cooperatively redesign products based on the experience. Companies can save time and money

by using the expertise of ELUs in the testing phase and can also prevent unwanted knowledge spillovers early in the development phase (Schweisfurth and Herstatt, 2016).

Further product improvements. Some ELUs may have very urgent needs for specific products. They may also want the products to fit perfectly with their requirements and they may start to develop customized solutions on their own (Keinz, Hienerth and Lettl, 2012; Hyysalo, 2009), which can be beneficial for the development work in general in the form of fresh and novel ideas.

Process developments beyond product innovations. ELUs can also have ideas that increase efficiency throughout the entire organization and in development processes (Schweisfurth and Dharmawan, 2019). These may be, for example, related to managerial or logistical aspects of production processes. Fjeldstad et al. (2012) found that collaboration with users has been shown to reduce risk, speed product entry to market, reduce the cost of product development, improve processes, and provide access to new markets and technologies.

Launch stage

At this stage, ELUs rely on their social resources. Cognitive empathy has a positive impact on communication flows with other users (Schweisfurth and Herstatt, 2015). When launching a product, ELUs deploy their structural resources by having access to user networks and relational resources because they have high level of credibility as active members in the user community (Schweisfurth and Herstatt, 2016; Schweisfurth and Raasch, 2015).

Facilitating launch communication. ELUs can act as brand ambassadors due to their product knowledge and use experience. When introducing products to the market, it is all about the end users, and who better to present the brand and the products than users themselves (Schweisfurth and Herstatt, 2016; Brives et al., 2020). Potentially holding an opinion leader role, ELUs are able to facilitate product launches (Schweisfurth and Herstatt, 2016; Schweisfurth and Herstatt, 2015). Because of their social networks, ELUs are able to facilitate product diffusion among users (Schweisfurth and Herstatt, 2015), as well. This is easily seen, for example, in kayaking, gaming, or mountain climbing, where social ties to the community are important and opinion leadership is hard to gain. It seems that opinion leadership is a central attribute of successful product diffusion by ELUs, in conjunction with their social networking skills.

RQ 3: What kinds of roles do ELUs have and how does their dual role in the user domain and the company influence the innovation process?

User representative inside the company. According to Wadell et al. (2013) the most prominent role of incorporated users is representing the users within the company. Based on their analysis, ELUs have two roles in the innovation process, strategic and operational. The difference between these roles is that in the strategic role, ELUs provide user knowledge for strategic decision making, and ensure that the company is targeting the relevant user-related problems sufficiently. ELUs also help to communicate strategy internally by acting as customer representatives inside the organization. In their operational role as operational representatives, ELUs provide colleagues with information about users, use experience, product requirements and user evaluations (Wadell et al., 2013).

Gatekeepers. ELUs can act as gatekeepers. They scan the external environment for new opportunities and translate and disseminate information to internal peers. Gatekeepers can exploit the information themselves but have a genuine interest in passing it on to others and to ensure that the information reaches those people in the organization who will be able to absorb and exploit it (Wadell et al., 2013). ELUs, like any other individuals, have multiple social identities, both professional and personal, and these can offer access to knowledge from contexts and

sources beyond organization boundaries (Ollila and Yström, 2016; Schweisfurth and Raasch, 2020). However, ELUs in this role can also choose the type of knowledge to pass on and hide the type of information they want to ignore.

Social networkers. ELUs have a critical role in overcoming knowledge barriers and facilitating the transfer of knowledge across organizational boundaries (Wadell et al., 2013). Without these networkers, the innovation process could come to a halt or move in a less promising direction. This is often due to the absence of dialogue between people relevant to the innovation process (Hauschildt and Schewe, 2000; Lee and Shin, 2017; Brives et al., 2020). In addition to this kind of social bonding, different types of material arrangements (apps etc.) can perform as intermediary objects to allow and enhance communication across different knowledge domains within the company and with external actors (Pedersen and Clausen, 2017; Hauschildt and Schewe, 2000; Keinz, Hienert and Lettl, 2012).

Change agent. ELUs act as change agents within the organization and influence it to become more user oriented and better connected with the user domain. In their research, Wadell et al. (2013) found that by incorporating ELUs into the innovation process, engineers and researchers in the company started to focus more on the user perspective and think how new products or solutions could solve a problem for the end user instead of the mere function.

This is needed because an organizational culture may facilitate emergence of the so-called not-invented-here syndrome (NIH). The tendency towards NIH may be triggered by the ego-defensive function of the underlying attitudes, for example R&D departments may have negative response to the involvement of external participants in innovations (Antons and Piller, 2015). In the R&D context, researchers have often been hired because of their unique expertise in a specific domain. Such individuals may demonstrate NIH when confronted with external knowledge in their particular domains to defend their expert status. Organizational inertia and structural rigidities challenge the transfer and use of outside knowledge at the organization level (Antons and Piller, 2015; Brives et al., 2020). Interestingly, it is suggested that over time ELUs may become entrenched in organization-specific knowledge, too, and this may reduce their ability to create highly innovative ideas and will make their innovative behavior less radical than behaviors of external lead users (Schweisfurth, 2017; Brives et al., 2020).

Sense-givers. ELUs can be described as sense-givers, not only do they suggest technical solutions which are able to anticipate the future. They can help to create a common understanding to make sense of the possible future product developments and their appropriateness for the future needs and usage contexts (Marchi et al., 2011). Ideally, an organization's R&D culture should be open enough to hear what ELUs have to say (Shah and Robinson, 2007).

Potential role conflicts. Embedded users can also be affected by conflicting demands between their work and the norms and values of the user domain. Such identity conflicts may affect job satisfaction of ELUs and their innovative behavior at work. Alignment of the norms and goals between the organization and its user domain can reduce these challenges (Brives et al., 2020; Schweisfurth and Raasch, 2020).

Misalignment can also emerge between ELUs and user domains. Having access to a variety of knowledge sources, ELUs may be regarded as credible actors related to new trends and are likely to have credibility among user domains. However, if external users know about the corporate affiliation of the ELUs, they can perceive a certain bias in the opinions of the ELUs that could be reflected in subjective referral of firm products, or unjustified excoriation of competitors' products. This might be damaging to their credibility as opinion leaders in the user community - if they are assumed to be more of a company advocate than a member of the community (Schweisfurth and Herstatt, 2015; Schweisfurth and Raasch, 2020).

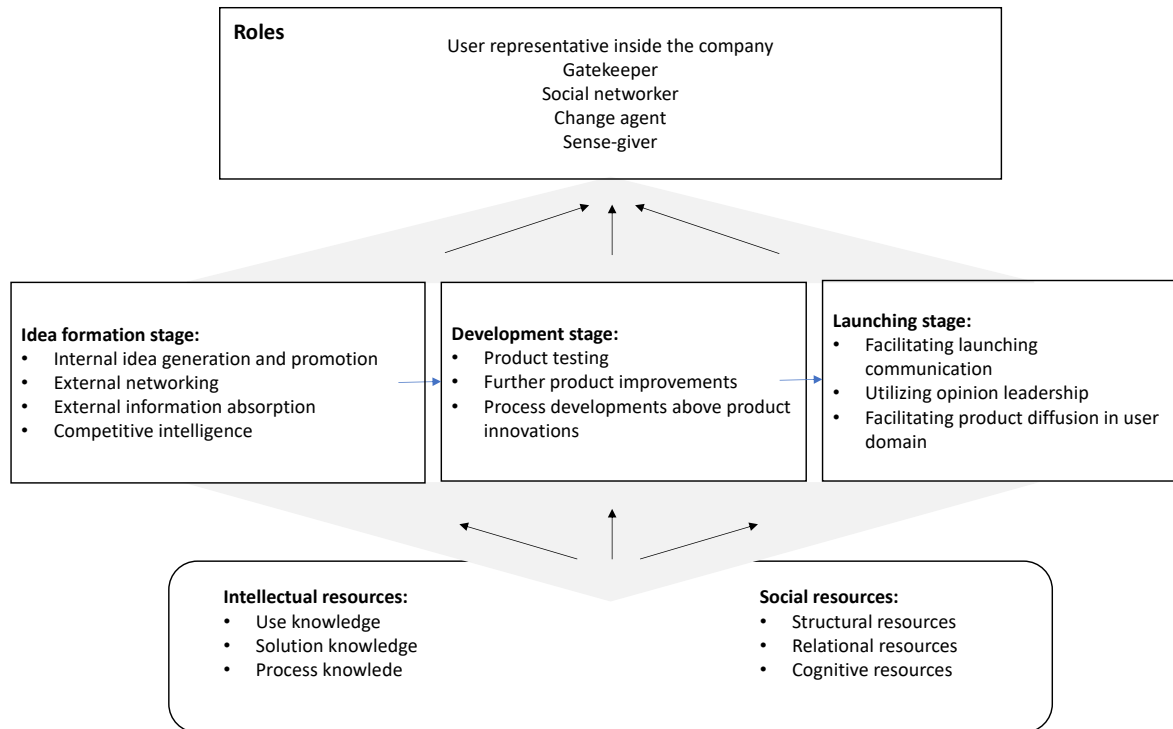


Figure 2. Framework of findings: ELU resources, contribution to different stages of innovation process and consequent roles.

4 Discussion

In this review, we have introduced and analyzed the role of ELUs in the innovation process. The level of collaboration and need for user involvement in company innovation processes depend on the company and the market it is operating in. Based on the existing research reviewed in this study, it can be very beneficial for companies to hire ELUs, because there are varied resources they are able to offer at different stages of the innovation process, from product-related knowledge to accessing valuable social capital such as user networks. By cooperating with ELUs, companies can increase the quality of the innovation related activities, improve their overall performance and extend their innovation and technology related networks (Wadell et al., 2013; Fjeldstad et al., 2012; Keinz et al., 2012). According to this study, ELUs can hold a key role in the development and commercialization of a product. ELUs can also connect the internal organization with external users and disseminate user information through their networking skills and social resources, both in their own organization and the user domain (Schweisfurth and Herstatt, 2015; Schweisfurth and Raasch, 2015).

4.1 Contribution to the existing research and potential avenues for future research

Based on the research conducted, we have provided new contributions to the more general discussion of lead users and innovation management, but primarily to the currently scarce research of embedded lead users. By forming a holistic picture in the form of synthesizing current ELU research and related dominant themes, this review offers a usable resource for future studies. Although the discussion of ELUs is fairly novel and niche, the results of this paper highlight the resources ELUs can offer organizations, and the utilization of these resources in different stages of innovation processes. There is also some understanding of the roles ELUs can take in organizations and innovation processes, as well as what tensions such dual roles can cause.

However, in those aspects there is certainly room for more in-depth studies (e.g., case studies) to improve understanding of related tensions and dynamics.

There are also several other avenues for future research to follow. Managers and key persons inside the organization and their role in developing better collaborative practices and enhancing informal communication in user collaboration could be studied as well, including the ELU perspective. Indeed, one core question is what role managers have in alleviating organizational inertia to improve the outcomes of the collaborative innovation process. There is substantial research on external lead users, their characteristics and willingness to share ideas, and the different modes of collaboration organizations can use with them (e.g., workshops, idea competitions, development projects, see Faullant et al., 2012; Mahr et al., 2012; Lilien et al., 20002; Marchi, Giachetti and Gennaro, 2011; Hienerth, Lettl, and Keinz, 2014), or management mechanisms to facilitate open innovation processes (Ollila and Yström, 2017). Further research should consider how dynamics of ELU collaboration differ internally and organizationally, and how collaboration with ELUs could be facilitated to benefit from their valuable resources.

Related to that, Ghasemzadeh et al. (2021) opened up an interesting line for research by highlighting the meaning of entrepreneurial self-efficacy as an antecedent for ELUs innovativeness and motivation to participate in innovation activities. Indeed, focusing on individual characteristics of ELUs in addition to their resources could be an interesting angle for future studies.

4.2 Managerial implications

In the innovation process, ELUs can connect the organization with its users and disseminate user information through their networking skills and social resources. To fully benefit from these internal innovators, companies need to learn how to attract and recruit ELUs, and then successfully integrate their valuable resources into the innovation work. At its extreme, innovation processes must change to be able to better utilize the resources ELUs can offer. This may mean that the responsibilities and activities of the different departments may change, and these changes need to be considered early when planning the collaboration. (Keinz et al., 2012; Shah and Robinson, 2007.)

ELUs also play an important role in product diffusion, and companies can utilize ELUs especially in markets where specialization in product features and use is important. For example, in sporting communities or health care networks (where social ties to the community are important and opinion leadership is hard to gain), it seems that membership of a user group and related credibility are central attributes to ELUs' roles as product diffusion facilitators in conjunction with their social networking skills.

Findings of this research also suggests that ELUs' roles as change agents promote user driven solutions inside the organization. Close, informal relationships with R&D offers great opportunities for ELUs to engage in their innovative work behavior and companies to capitalize on user innovation.

4.3 Limitations of the study

This research was conducted as a systematic literature review and is thus limited in contribution by the lack of empirical evidence. The focus on only ELU research also resulted in a relatively low number of articles in the systematic literature review. However, the authors had to balance between keeping the focus on ELUs (excluding much wider lead user literature, for example), and obtaining sufficient literary resources to form the entity and understanding of the current state of ELU literature. Strictly sticking to the ELU perspective can be seen as a strength of the

study, too, for in its present form this conceptual synthesis creates a coherent understanding of the emerging ELU discussion.

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Appendix

Author/s	Title, Publication	Focus of the research
Ghasemzadeh, K., Bunjak, A., Bortoluzzi, G., & Černe, M. (2021)	Efficaciously smuggling ideas: untangling the relationship between entrepreneurial self-efficacy, creative bootlegging and embedded lead users. <i>International Journal of Innovation Management</i> , 25(03), 2150032.	Embedded Lead User
Brives, M., Scaringella, L., & Mao, J. (2020)	Unexploited and unknown treasures – an exploration of internal lead users' position. Manchester: The International Society for Professional Innovation Management (ISPIM) conference	Embedded Lead User
Schmidt-Keilich, M, Schrader, U. (2019)	Sustainability innovation by integrating employees: the potential of sustainable embedded lead users. <i>International Journal of Innovation and Sustainable Development</i> . Vol. 13, No. 1, 98-115	Embedded Lead User
Schweisfurth, T.G. & Raasch, C. (2020)	Caught between the users and the firm: How does identity conflict affect employees' innovative behavior. <i>Creativity and Innovation Management</i> . 29, 380–397.	Embedded Lead User
Schweisfurth, T, G., Dharmawan, P.M. (2019)	Does lead userness foster idea implementation and diffusion? A study of internal shopfloor users. <i>Research Policy</i> . 48, 289–297.	Embedded Lead User
Schweisfurth, T, G., Herstatt, C. (2015)	Embedded (Lead) Users as Catalysts to Product Diffusion. <i>Creativity and Innovation Management</i> . Vol. 24,1:151-168.	Embedded Lead User
Schweisfurth, T, G., Raasch, C. (2015)	Embedded lead users —The benefits of employing users for corporate innovation. <i>Research Policy</i> . 44, 168–180.	Embedded Lead User
Schweisfurth, T, G., Herstatt, C. (2016)	How internal users contribute to corporate product innovation: the case of embedded users. <i>R&D Management</i> . 46, S1, 107-126.	Embedded Lead User
Schweisfurth, T, G. (2017)	Comparing internal and external lead users as sources of innovation. <i>Research Policy</i> . 46, 238–248.	Embedded Lead User
Wadell, C., Sandström, G, Ö., Björk, J. & Magnusson, M. (2013)	Exploring the incorporation of users in an innovating business unit. <i>International Journal of Technology Management</i> . Vol. 61, Nos.3/4, 293-307.	Embedded Lead User
Fjeldstad, O, D., Snow, C, C., Miles, R. & Lettl, C. (2012)	The Architecture of Collaboration. <i>Strategic Management Journal</i> . 33: 734–750.	Organization design
Keinz, P., Hienerth, C., Lettl, C. (2012)	Designing the Organization for User Innovation. <i>Journal of Organization Design</i> . 1(3): 20-36.	Organization design
Hauschildt J, Schewe g. (2000)	Gatekeeper and process promotor: key persons in agile and innovative organizations. <i>International Journal of Agile Management Systems</i> ; Bradford. Vol. 2, Iss. 2: 96-104.	Internal boundaries and roles
Antons, D., Piller, F, T. (2015)	Opening the black box of “Not Invented here”: Attitudes, Decision Biases, and Behavioral Consequences. <i>Academy of Management Perspectives</i> . Vol. 29, No. 2, 193–217.	Internal boundaries and roles
Lee, S & Shin, J. (2017)	A Path to Collaborative Innovation Through Internal Boundary Breaking. <i>Research Technology Management</i> . 26-32	Internal boundaries and roles

Author/s	Title, Publication	Focus of the research
Marchi, G, Giachetti, C, Gennaro, P. D. (2011)	Extending lead-user theory to online brand communities: The case of the community Ducati. <i>Technovation</i> . 31: 350–361.	Collaborative innovation
Heiskanen, E, Hyysalo, S, Kotro, T & Repo, P. (2010)	Constructing innovative users and user-inclusive innovation communities. <i>Technology Analysis & Strategic Management</i> . Vol. 22, No. 4, 495–511.	Collaborative innovation
Hyysalo, S. (2009)	User innovation and everyday practices: micro-innovation in sports industry development. <i>R&D Management</i> . 39, 3: 247–258.	Collaborative innovation
Ollila, S., Yström, A. (2016)	Exploring Design Principles of Organizing for Collaborative Innovation: The Case of an Open Innovation Initiative. <i>Creativity and Innovation Management</i> . Vol. 25, Num. 3. 363- 377.	Collaborative innovation
Shah, S.G.S. & Robinson, I. (2007)	Benefits of and barriers to involving users in medical device technology development and evaluation. <i>International Journal of Technology Assessment in Health Care</i> . 23(1), 131–137.	Collaborative innovation
Pedersen, S & Clausen, C (2017)	Staging Collaborative Innovation Processes. This paper was presented at The XXVIII ISPIM Innovation Conference – Composing the Innovation Symphony, Austria, Vienna on 18-21 June 2017. The publication is available to ISPIM members at www.ispim.org .p. 1-11.	Collaborative innovation

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