Identifying valuable users as informants for innovation processes: Comparing the search efficiency of pyramiding and screening

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ABSTRACT

Users represent an often untapped source of knowledge which companies can capitalize on during different stages of the innovation process. However, identifying helpful users for innovation projects is far from trivial as these individuals are often hidden within considerably larger populations. We contribute to open and user innovation research by empirically investigating the efficiency of pyramiding and screening, two methods used to identify valuable users. Analyzing a sample of 942 children in 42 school classes, we show that pyramiding, a search process based on personal references from user to user, is significantly more efficient in identifying rare individuals than screening, even though many references are not based on close personal relations. Pyramiding's relative efficiency advantage increases with the size of the population being searched. Finally, we explore how searchers can further increase pyramiding search efficiency by using information to select promising starting points or prematurely abandoning unpromising search chains.

1. Introduction

Users carrying knowledge regarding product use, customer needs, and demand trends constitute one of the most important sources of knowledge for innovation processes (Chatterji and Fabrizio, 2014; Cohen et al., 2002; Laursen and Salter, 2006; von Hippel, 1988). Aside from eliciting documented user-related information from existing databases or media, companies can try to draw on users as personal informants to receive contingent, meaningful and reliable input. Research on innovation and marketing shows that this may best be achieved by selecting special customers based on their ability to provide rich innovation-related information rather than relying on broad customer samples (Hoffman et al., 2010; Piezunka and Dahlander, 2014; von Hippel, 1988). Unfortunately, special individuals such as lead users, opinion leaders or high expert users typically represent only a small fraction of the entire population (Lüthje, 2000). Thus, one of the most important steps in sourcing external information is the identification and selection of the 'right' users (Laursen and Salter, 2006; Lilien et al., 2002; Lüthje and Herstatt, 2004; Mahr and Lievens, 2012).

This study focuses on investigating the efficiency of pyramiding and screening, two search strategies aiming at acquiring rich knowledge from external informants with special characteristics (Faullant et al., 2012; Hyysalo et al., 2015; Lüthje, 2000; Poetz and Prügl, 2010; Schreier et al., 2007; von Hippel, 2005; von Hippel et al., 2009). In screening, the searcher collects information from all members of a given population to identify users with the characteristics being sought. In pyramiding, the searcher follows search chains consisting of respondents' referrals to other persons expected to have the desired attributes at a high level. Related research showing that potentially attractive informants are often well-connected, underscores the potential of reference-based search strategies such as pyramiding to efficiently identify them (see e.g. Kratzer and Lettl, 2009).

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Table 1
Selected characteristics of different search strategies.

	Pyramiding	Screening	Broadcasting
Search logic	Following referrals that subjects make to others with the desired qualities	Measuring the qualities of all members in a population	Inviting subjects with desired qualities to self-select
Task of the users	Assess others	Assess yourself	Assess the fit between yourself and the request
Search effort	Varying with the number of subjects on the search paths	Varying with the number of subjects in the search population	Rather independent from the number of subjects in the search population
Guarantee of finding the person with the highest attribute level	No	Yes	No

Search efficiency is important, as failure to account for search effort may lead to 'over-search', that is, acquiring external knowledge exhibiting an unfavorable benefit-cost-ratio (Foss et al., 2011; Laursen and Salter, 2006). While several studies on user involvement and customer co-creation have highlighted the risk of high monetary and nonmonetary cost of external knowledge search (Hoyer et al., 2010; von Hippel, 2005), the analysis of search efficiency has received little attention (Lüthje and Herstatt, 2004; Mahr et al., 2014). In the only study empirically comparing pyramiding and screening efficiency, von Hippel et al. (2009) show that pyramiding requires less effort than screening to identify a target person in small groups.

This study is an extended replication of the work by von Hippel et al. (2009) which we expand in three important ways: First, we consider a broader set of personal attributes that companies may select when searching for valuable users as informants. This study involves multi-faceted variables of low visibility (e.g. user behavior, consumption values) going beyond standard socio-demographic or simple psychographic attributes. This allows for a 'stress test' of pyramiding relatively to screening as these search attributes constitute a challenge particularly for reference-based search processes. Second, we consider the size of the population being searched as one important contingency of pyramiding search. Extending initial findings on pyramiding efficiency in this way is highly relevant, as searches in typical real-world applications will usually involve large populations. Third, we investigate how a searcher may further increase pyramiding efficiency by selecting appropriate starting persons for the search or by abandoning unpromising search chains.

To test our hypotheses, we conducted a quasi-field experiment involving 13,188 simulated search chains generated from 942 pupils in 42 school classes.

In the next section, we develop the conceptual underpinnings for our study. We then derive hypotheses, describe the research methods we used to test them, and discuss our findings. Finally, we detail some implications and opportunities for further research.

2. Conceptual background

Methods for systematically accessing information from users and customers fall into two major groups. One group of search tools makes use of existing secondary, mostly digital, datasets. Netnography, for instance, refers to conducting ethnography-like research on the internet by interpreting qualitative, mostly text-based data in its digital context (Belz and Baumbach, 2010; Kozinets, 2002). Big data comprises a broad set of quantitative analytics, primarily relying on the connection of multiple electronic data (Berger and Doban, 2014; Tirunillai and Tellis, 2014). Data-based methods have been successfully used in practical applications, such as the analysis of user-generated online content (Belz and Baumbach, 2010; Tirunillai and Tellis, 2014). While available data on users and customers is growing exponentially, search methods relying on secondary data have limitations in the context of innovation projects. Market researchers often need to answer questions for

which user data is incomplete or entirely unavailable. Even if user data exists, it is sometimes difficult to interpret (Lüthje et al., 2005; Sánchez-González et al., 2009; von Hippel, 1994). Researchers may lack information about users' backgrounds or the situation in which the data was generated. In addition, particularly qualitative data encoded in text messages may be equivocal or even contradictory which impedes sense-making and arriving at clear inferences (Huberman and Miles, 2002).

A second group of approaches relies on primary information elicited from customers and users. Communication with these knowledge holders represents a very rich information medium allowing searchers to pose specific questions, inquire the background of the informants, and register contextual cues (Auster and Choo, 1994; Saunders and Jones, 1990). When using these procedures, the focus of the search shifts from scanning existing data to tracing valuable informants. Thus, a primary challenge when involving users as informants is identifying the 'right' targets. Pyramiding, screening, and broadcasting constitute three viable approaches that are commonly used to this end (see Table 1).

Pyramiding is a sequential search process aiming at identifying target informants via personal references (Poetz and Prügl, 2010; von Hippel et al., 2009). The searcher begins by asking an initial contact about her status relative to the search attribute in question. This initial contact is also asked to provide references to other persons whom she believes to exhibit even higher levels of the personal attribute being sought (direct referral). A typical question is 'Do you know a person who displays high levels of the special quality we are looking for?' (von Hippel et al., 2009). These persons are then approached and asked the same questions. The searcher follows the referral chains until people with sufficiently high levels of the quality being sought have been identified. As prior research has shown that lead users and opinion leaders are often well-connected (Kratzer and Lettl, 2009), searchers may hope that at least some of these special informants are well-known enough to be quickly referred to them. These findings suggest that pyramiding may hold great potential for identifying valuable informants. Yet, it is important to note that searches may fail to identify the person at the top of the pyramid, if mistaken self-assessments or loops in search chains allow the searcher to only reach local maxima.

Screening involves the parallel collection of information from every member of a population to identify the subjects with the qualities being sought. In contrast to pyramiding, it exclusively relies on what individuals know about themselves. Given a well-mapped search space with clear boundaries, access to all members of the population, and valid self-assessments, screening will lead searchers to the persons displaying the highest level of the predefined search attribute.

Broadcasting starts with announcing an information request and invites those with desired qualities to reveal themselves as the targeted users. This approach builds on the expectation that the right subjects will select themselves and approach the seeking entity. Prior research on innovation platforms shows that, in fact, capable and interested people can be attracted to problems