

User Typologies and Research Approaches for Successful Product and Service Innovations

Chakrit Pichyangkul^{1,*} and Praisma Israsena²

ABSTRACT

The front-end of innovation has been long portrayed as the most important area of some very successful innovations where companies have tried to identify, obtain, and maximize the benefit of internal and external ideas at the early stages of the innovation process. Recently, the concept of user innovation, one of the most practiced open innovation approaches, has played a crucial role in new product and service development especially during the opportunity identification phase at the front-end. However, traditional user innovation approaches are not able to reasonably empower users for engaging in the market of open innovation. Since there are distinct characteristics in the nature of product and service development, the question remains unclear as to which user typologies and research approaches are able to provide the most valuable insights for product and service innovations. The objective of this study was, therefore, to investigate the relationship patterns of the most useful user typologies and research approaches for each form of innovation. Mixed methodology was employed to gather patterns of 27 self-evaluated successful cases from 10 leading innovation consulting firms in the U.S.A. The empirical findings reveal that ‘less’ users can provide the most interesting insights for product innovation while early adopters are recommended for recruitment if companies want to search for service innovation. The inquiry approach can be very efficient when conducting front-end user research of product innovation while participatory and trend-tracking approaches should be considered when searching for service innovation. The new matching schemes can guide researchers and business practitioners to effectively and efficiently manage their opportunity identification phase at the front-end of this new era.

Keywords: product innovation, service innovation, co-creation, front-end of innovation, user innovation

บทคัดย่อ

กระบวนการช่วงต้นของการพัฒนาวัตกรรมนับเป็นช่วงสำคัญที่สุดในการหาโอกาสใหม่ๆ ทางธุรกิจ โดยการใช้องค์ความรู้ทั้งจากภายในและภายนอกองค์กร เพื่อวัตกรรรมที่ประสบความสำเร็จเมื่อออกสู่ตลาด และเพื่อตอบรับกับกระแสของการ

พัฒนาวัตกรรรมจากผู้ใช้สินค้าหรือบริการซึ่งเป็นส่วนหนึ่งของการพัฒนาวัตกรรรมแบบเปิดในยุคที่องค์กรต่างๆ ไม่สามารถขึ้นอยู่กับความรู้ความสามารถภายในองค์กรเป็นหลักได้อีกต่อไป ในยุคปัจจุบัน จึงเป็นยุคของการนำผู้ใช่มาร่วมสร้างสรรค์งานวัตกรรรม โดยเฉพาะในขั้นตอนแรกคือการหาโอกาสใหม่ๆ จากงานวิจัยที่ผ่านมาแสดงให้เห็นว่า

¹ Technopreneurship and Innovation Management Programing, Graduate School, Chulalongkorn University, Bangkok 10330, Thailand.

² Department of Industrial Design, Faculty of Architecture, Chulalongkorn University, Bangkok 10330, Thailand.

* Corresponding author, e-mail: agrpcp@ku.ac.th

วิธีการเลือกประเภทผู้ใช้และเก็บข้อมูลจากผู้ใช้แบบเดิมๆ ก็ยังคงมีข้อจำกัดในหลายๆ ด้าน รวมไปถึงลักษณะเฉพาะตัวของการพัฒนาผลิตภัณฑ์และบริการ ก็มีความแตกต่างกัน จุดประสงค์ของงานวิจัยฉบับนี้ จึงเน้นไปที่การศึกษาหาความสัมพันธ์ของประเภทผู้ใช้และวิธีการเก็บข้อมูลที่ทำให้ประโยชน์มากที่สุด กับนวัตกรรมแต่ละประเภทด้วยการเก็บและวิเคราะห์ข้อมูลแบบผสมผสานจาก 10 บริษัทผู้คิดค้นนวัตกรรมผ่านกระบวนการสร้างสรรค์ร่วมช่วงต้นที่ประสบความสำเร็จจำนวน 27 โครงการ

ผลการวิจัยสรุปว่า ผู้ใช้สินค้าหรือบริการด้วยความถี่น้อยให้ข้อมูลที่เป็นประโยชน์มากที่สุดสำหรับนวัตกรรมผลิตภัณฑ์ ในขณะที่ผู้ใช้หัวก้าวหน้าให้ข้อมูลที่เป็นประโยชน์ที่สุดสำหรับนวัตกรรมบริการ วิธีเก็บข้อมูลแบบถามตอบเหมาะสมกับนวัตกรรมผลิตภัณฑ์ ในขณะที่การพัฒนาบริการควรใช้วิธีเก็บข้อมูลแบบเชิญผู้เข้าร่วมคิดร่วมทำ และเก็บข้อมูลโดยการหาแนวโน้มของอนาคต

ประโยชน์ที่ได้จากงานวิจัยนี้ คือองค์ความรู้ใหม่ของการสร้างสรรค์ร่วมช่วงต้น โดยการให้ความสำคัญกับประเภทของผู้ใช้และวิธีเก็บข้อมูลที่เป็นประโยชน์มากที่สุด แทนที่จะถามผู้ใช้ทั่วไปด้วยวิธีการเก็บข้อมูลที่ไม่เหมาะสม ซึ่งไม่ได้ประโยชน์ เสียเวลาและทุนทรัพย์จำนวนมาก อันนำมาซึ่งประโยชน์เพิ่มประสิทธิภาพและประสิทธิผล ในการสร้างสรรค์ร่วมช่วงต้น เพื่อนวัตกรรมที่ประสบความสำเร็จอย่างสูงสุดในอนาคต

คำสำคัญ กระบวนการพัฒนานวัตกรรม การพัฒนานวัตกรรมจากผู้ใช้นวัตกรรมแบบเปิด วิธีเก็บข้อมูลประเภทผู้ใช้

INTRODUCTION

Distinguish a winner from losers at the front-end

In order to cope with the changing pace of today's market, companies have to innovate

competitively and differentiate themselves from others (Smith, 2006). By doing so, they invent new technologies and identify new market segments (Koen et al., 2001). The challenge is who can be the first to capture new opportunities to satisfy customers, to get ahead of the competition.

First of all, the ability to innovate demands an accurate understanding of both the market and technology (Luecke, 2009). Within the innovation process, the most significant action is at the front-end where companies try to identify opportunities and to obtain and maximize the benefits of internal and external ideas that lead to new concept offerings (Koen et al., 2001). The front-end of innovation is a systematic process that begins with opportunity identification where companies search for novel products or service insights. Such new ideas are further analyzed to determine whether they are worth being pursued. If so, even more ideas are generated and screened to match with the corporate strategy, capability, and competency (Koen et al., 2001). The most feasible idea then is developed and tested before handing over to production for commercialization (Luecke, 2009).

In spite of the importance of the later stages within this pre-development phase, it is increasingly accepted that successful new product development correlates strongly with the quality of the stage of opportunity identification and analysis (Cooper, 1985). One of the major objectives of this stage is to search for new insights where companies can distinguish a winner from losers depending upon how well they understand the market (Cooper, 1988). The lack of variety and valuable insights, as a result of this stage, may cause costly problems in later stages of the new product development process (Cooper, 1988). Cooper and Edgett (2008) confirmed this investigation by stating that about twice as many high-efficiency businesses employ an initial market assessment very early in the innovation process when compared to low-efficiency companies.

Studies have shown that companies can improve the value and probability of success of such opportunities if the front-end of innovation is managed efficiently and effectively (Verworn, Herstatt, & Nagahira, 2006). Nevertheless, the front-end of innovation is mostly unstructured, chaotic, and unpredictable (Cooper, 1988). Unwise management of the process may result in the poor definition of customer requirements and an infeasible product concept (Khurana & Rosenthal, 1997).

User innovation

There have been many attempts to structure the front-end of innovation for more productive results. Since the era of open innovation, companies have been leveraging their internal research and development outside their current operations and utilizing the benefit of external knowledge (Chesbrough, 2006). The network of outsiders is crucial to establish a thorough understanding of the market. Among these is user innovation, which aims to integrate users' ideas into the innovation process (Gassman, Enkel, & Chesbrough, 2010). Studies have shown a positive correlation of customer involvement in the innovation process with the success rate of a product's commercialization (Murphy & Kumar, 1997). Salomo, Steinhoff, and Trommsdorff (2003) studied customer orientations and reported that integrating users' ideas into the innovation process can increase the degree of *product* innovativeness resulting in new product development *success*. Therefore, the development of innovation has shifted from the previous understanding of markets as a whole, to user innovation as one of the most talked about and applied among all open innovation approaches (Gassman, Enkel, & Chesbrough, 2010). The next section explains user innovation approaches and their limitation during the opportunity identification and analysis phase because of its significance as earlier explained.

LITERATURE REVIEW

User innovation approaches

According to an extensive review of the available literature, user innovation can be categorized into five approaches: inquiry, observation, participation, trend-tracking, and co-creation. Each approach reveals its own unique way of understanding users based on its objective. This includes validating existing offerings, detecting unarticulated needs, understanding heterogeneous needs, predicting the future, and co-creating values.

First, the inquiry approach involves companies trying to understand consumers by simply asking preset questions about user needs, a new offering, or to validate an existing prototype by typical user surveys, focus groups, group interviews, or a combination of these (Morgan, 1996). However, these methods may limit responses to current expectations and rarely lead to insights because of predefined goals (Whitney & Kumar, 2003).

Second, the observation approach, for example, ethnography, aims to collect information by observing users in their real-life setting and is claimed to provide the greatest insights and intensity of knowledge into users' unarticulated needs (Cooper & Edgett, 2008). However, these methods are rather costly and time consuming (Whitney & Kumar, 2003). The skill set of observers is expected to be extremely high, and not all possess such skills or have been trained to perform the task competently (Leonard & Rayport, 1997).

Third, the participation approach includes participatory design where the people who will be using a product have been given an opportunity to co-design (Steen, Kuijit, & Klok, 2007). This approach is able to answer the heterogeneous needs of customers (Sanders & Stapper, 2008). Nevertheless, designers and users do not truly collaborate; social and political aspects are not incorporated into the process, and representativeness is difficult to accurately pinpoint and portray (Grudin & Pruitt, 2002).

Fourth, the trend-tracking approach uses poll and demographic data from various sources to search for patterns of values, culture, and perceptions, such as scenario planning and trend analysis, to foresee the future (Meadows, 2002). Additionally, lead users research aims to capture novel solutions from the most sophisticated group of consumers (von Hippel, 1986). Even so, the result is too broad, less applicable, and sometimes way too advanced for today's customers (Whitney & Kumar, 2003; Sanders & Chan, 2007).

Fifth, the co-creation approach is where innovating with users has expanded the territory to invite users, experts, or anyone who exists within the value chain to join in co-creation sessions (Sanders & Stapper, 2008). All these stakeholders are actively involved in the value creation process with the help of the idea-generative tools and techniques that are employed (Prahalad & Ramaswamy, 2004; Sanders & Stapper, 2008). However, not all users can fulfill these complex tasks. Certain characteristics of users are required with specially designed techniques to gather data (Herstatt, 2002).

User innovation approaches demonstrate certain limitations that are unable to truly engage users in the market of open innovation. Hence, this paper aimed to investigate novel user research approaches in order to tackle this paradigm shift within two types of innovation: product and service innovation.

New product versus service development

New product development has always been a subject of interest among scholars and business practitioners. New service development, on the other hand, has recently received much attention due to the rapid pace of structural changes in service industries in many developed countries (Alam, 2006).

As mentioned, customer involvement at the front-end relates positively to the performance of product innovation and to an even greater extent to service innovation (Sundbo, 1997). The new service

development, therefore, requires a rather more sophisticated approach compared to new product development. The reasons behind this challenge are derived from the unique characteristics of services: intangibility, inseparability, heterogeneity, and perishability (de Brentani, 1991). Since services are more intangible, the ability to conceptualize the service process is required. According to Shostack (1984), in order to successfully design a new service, service users should be actively involved for a much broader set of functional specialities than for product development because the production and consumption of a service are inseparable. Service is also heterogeneous in nature. In other words, the performance of service may vary at each purchase occasion. Hence, understanding the broader spectrum of users is valuable in order to reduce customer uncertainty that may occur (Shostack, 1984). Lastly, service is perishable and cannot be produced in advance; the most efficient service process must be thoroughly planned in order to cope with fluctuations in demand during the business cycle (Avlonitis & Papastathopoulou, 2006). Engaging with the most and least demanding customers may provide valuable insights at the front-end of service innovation.

It seems that the characteristics and involvement of users in the development of product and service innovation are different. This paper, therefore, proposes to explore front-end user research approaches and user typologies for product and service innovations.

User typologies for user innovation

Based on the investigation of Schuurman, Moor, Marez, and Evens (2010), user typologies or individual characteristics of users should be considered when searching for a successful way of involving users within the innovation process. The purpose of this categorizing scheme is to match users with the research aspects in question. These characteristics include the rate of use, variety of use, ability to generate solutions, and the rate of adoption.

The first and easiest way to understand users is by observing the usage frequency of those who consume the products or services. According to Herstatt (2002), if the idea is to improve existing product performance, gathering input from regular users is adequate to identify new needs. They are a group of users who use the product regularly, generally within everyday situations.

In addition to the aspect of rate of use, the Use-Diffusion Model of Shih & Venkatesh (2004) added another aspect of variety of use and debated that users who possess a certain degree of both aspects can influence better the ideation process. While the rate of use refers to the duration of product usage, the variety of use refers to the level of use innovativeness. Their studies resulted in four user groups; intense users (high rate of both use and variety of use), specialized users (high rate of use and low variety of use), non-specialized users (low rate of use and high variety of use), and limited users (low rate of both use and variety of use).

The third aspect, the ability to generate solutions, led to the discovery of lead users who can direct companies to search for future needs. Lead users are a group of consumers who come up with their own, novel solutions ahead of today's markets since the current offering is not able to satisfy their needs (Luthje & Herstatt, 2004). Evidently, this group has the ability to generate insights of future opportunities.

The fourth aspect, the study of Rogers (2003) regarding the Diffusion of Innovation Model, also reflects the unique characteristics of users based on the rate of adoption. They are innovators, early adopters, early majority, late majority, and laggards depending on how fast the users adopt certain products or services. The willingness to acquire a new offering may imply a degree of interest and knowledge that can be valuable at the front-end of the innovation process.

Of all the types of users mentioned, extreme users may possess any of the characteristics but to the minimum or maximum extremes of any of the

specified aspects (Rothwell & Gardiner, 1983). They may represent consumers who live in extreme conditions, at the border of society, excluded from everyday normality, who cannot afford to pay for a certain product or service, or those who choose not to consume it. Therefore, atypical input from extreme users can be insightful and provide extremely novel ideas in dealing with uncommon situations (Ideo, 2011).

Users who possess distinct characteristics are very beneficial as a source of innovation that may come in many forms. Unfortunately, to date there have been no direct investigations of the correlation of user typologies and innovation typologies within the user research context for new product development in the market of open innovation. The question remains unclear as to which user typology, or which combination, is able to provide the most useful data for certain forms of innovation.

RESEARCH OBJECTIVE

Therefore, the objective of this study was to investigate and identify the relationship patterns of the most useful user typologies and user research approaches for product and service innovations during the opportunity identification phase at the front-end, in order to comply with the concept of open innovation.

RESEARCH METHODOLOGY

Considering the limited number of experts within this field of study, nonprobability purposive sampling was selected for companies' unique characteristics of involvement in identifying and analyzing opportunities, based on the practice of user innovation approaches, in order to search for new participants to challenge new patterns with the ability to refer to others who may show similar interest (Cooper & Schindler, 2008). The variety of

successful cases from multiple industries was chosen based on the recommendation of Cooper and Schindler (2008) for comparison and generalization purposes. Following the recommendation of Hauwchildt (1991), the success of certain innovation projects should be assessed at different stages in different aspects depending upon the companies' predefined goals for such stages. Therefore, the success aspect of innovation at the front-end of this research was self-evaluated by companies.

A mix of qualitative and quantitative methods was used. First, a multiple-case studies methodology was employed following the recommendation of Yin (1994) to recognize the relationship patterns of 27 self-evaluated successful cases from 10 leading innovation consultancies in the USA, who are forward thinkers from well-established territories where front-end user innovation approaches originated and have been gradually developed to an advanced stage. Cooper and Schindler (2008) also confirmed the case study research as most suitable with this research context, that aims to investigate new product development processes for similarities.

Data gathering techniques for this research used individual in-depth interviews with team leaders and researchers. Historical project documents provided by the subjects or those available from the companies' websites were also reviewed.

In order to analyze the patterns from cases, content analysis was used to search for common phrasing, words, and context. It is likely to predict similar results in terms of analytic generalization if a theoretical pattern is found, considering the nature of this research framework that aims to clarify and search for relationships and logic among constructs (Yin, 1994; Eisenhardt & Graebner, 2007). The following are keywords that were matched with the context stated during the interview.

1. Regular users - use the product in everyday situations, use the product with regular frequency as it is intended to be used or use the

product regularly.

2. Frequent users - use the product more often than it is intended.

3. Less users - use the product less often than it is intended.

4. Early adopters - are the first to buy the new product without following others.

5. Lead users - are not satisfied with existing products and adapt them to fit their unmet needs.

6. Extreme users - are those who possess any extreme aspects in question.

Though this research was conducted using a qualitative approach, data from the interviews were converted to a 0-4 scale based on the priority given to various users and research approaches of a particular project. In order to ensure the reliability of the results, two other raters were invited to perform the coding all together. The scales were finally agreed and reported after thorough discussion. The correlation value of each typology and approach was also calculated to search for any relationships in product and service innovations for well-defined explanations, not for statistical generalization.

RESULTS AND DISCUSSION

The goal of conducting user innovation approaches is to search for insights from the huge amount of data that may be derived from a particular group of users or combination of groups. Of all the projects investigated, regular, less, extreme, frequent, lead users, and early adopters were among the most recruited groups of users found useful in providing valuable insights as seen in the mapping based on the rate of use versus the rate of adoption in Figure 1.

The most useful user typologies and research approaches

Researchers define regular adopters, early adopters, and extreme users in terms identical to those used in the standard literature. However, most researchers cannot distinguish between lead users

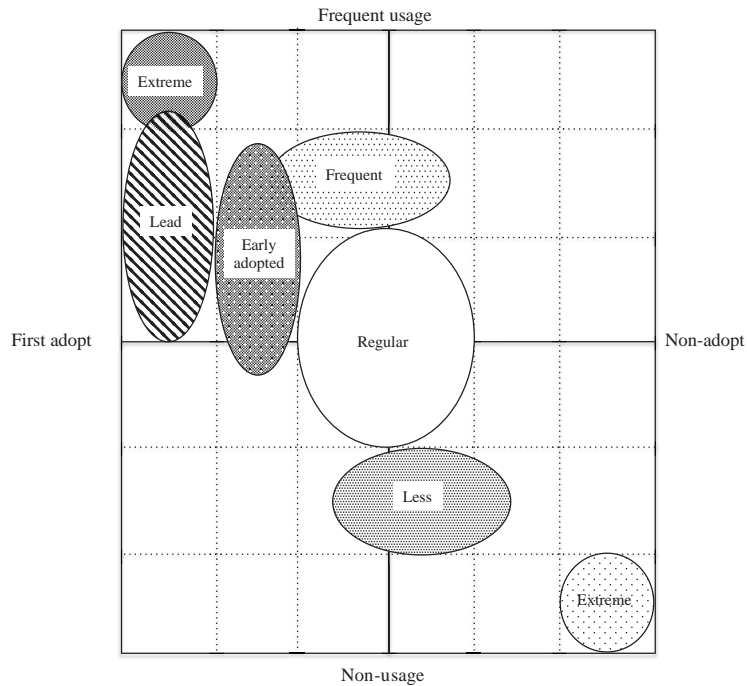


Figure 1 User typologies based on rate of adoption and rate of use

and early adopters. They believe the two groups possess similar characteristics, when in fact they are totally different, as defined by von Hippel (1986) and Rogers (2003). Two new groups of users were also identified—less and frequent users. Less users do not spend much time on and tend to later adopt the product or service, but not to the extreme, while frequent users adopt new offerings faster and engage with product or service usage more often than others. Frequent and less users are similar to intense and limited users, respectively, as defined by Shih and Venkatesh (2004), without considering the variety of use.

Table 1 illustrates the relationship patterns of user typologies and research approaches with the two forms of innovation. While product innovation means the companies aim to improve the performance of an existing, tangible offering, service innovation searches for new insight for further development of intangible forms serving the changing pace of today’s market. Users’ typologies refer to six types of useful users that were rated on a

0-4 scale based on the priority given. Research approaches means the five useful methods that complied with the literature on conducting front-end user research that also were rated on a 0-4 scale based on the priority given. The next section analyzes each cluster in detail followed by user priority and research approaches priority to match with the two forms of innovation—product and service innovation.

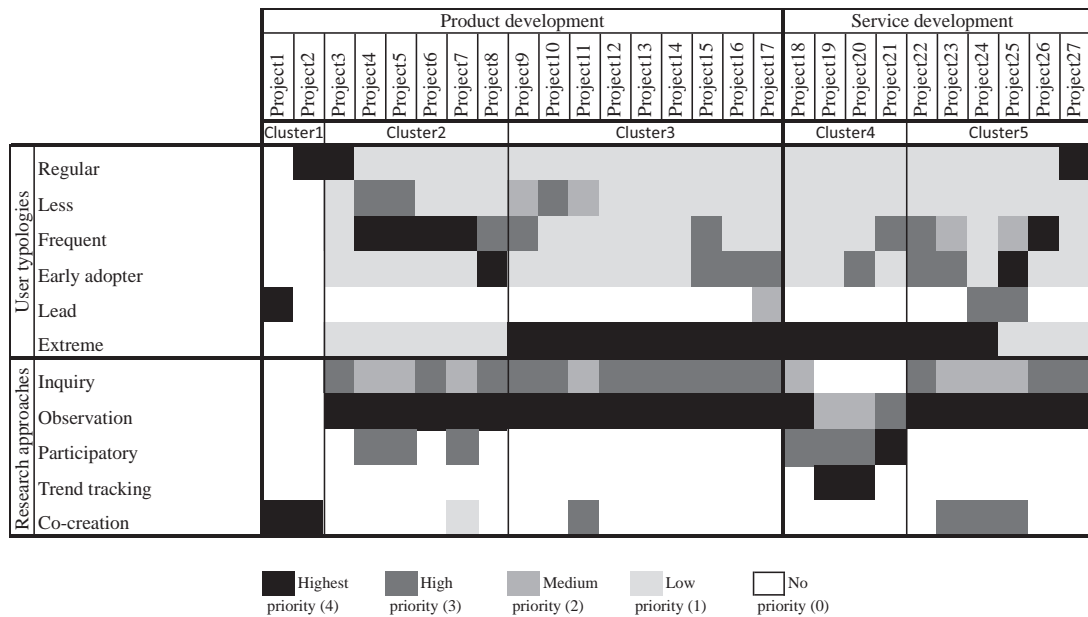
Cluster analysis

The relationship patterns of user typologies and research approaches were identified. There were five clusters, as illustrated in Table 1 that were grouped based on similarity. The following explains and analyzes the five clusters in detail.

Cluster one included a company specializing in a co-creation approach that called for particular groups of users—namely, regular and lead users.

Cluster two mainly represented the minor improvement of technical products that demanded in-depth users’ participation to cover all aspects.

Table 1 Relationship patterns of product and service innovations with user typologies and research approaches



These projects, therefore, considered less users, frequent users, and early adopters and employed a combination of observation, participatory, and inquiry approaches, respectively.

Cluster three referred to projects that demanded input from extreme users to trigger new insights since a higher level of newness was anticipated. Because of limited time and budget, all projects within this cluster employed observation and inquiry approaches, which are relatively less expensive and less time-consuming compared to other approaches.

Cluster four was mainly conducted by a company specializing in a combination of observation, participatory, and trend tracking approaches that aimed to innovate for an even higher level of newness. The focus was given to extreme users, frequent users, and early adopters who were able to provide valuable insights in various situations.

Cluster five mainly represented technical services that required rather sophisticated groups of

users and research approaches. These projects considered frequent users and early adopters. Observation, co-creation, and inquiry, were the research approaches employed.

Each cluster visualizes the relationship of the three aspects of investigation; product versus service innovation, user typologies, and research approaches. The understanding of such relationships can lead to the most effective and efficient selection of user typologies and research approaches that are elaborated on in the next section.

User priorities

Instead of prioritizing users equally, product and/or service innovation requires a distinct approach in selecting the most useful user typologies. The following explains in detail the user priorities given to each form of innovation. The values in parentheses indicate the correlation value (r) for explanatory purposes as also illustrated in Table 2.

Product development indicates less users as

Table 2 Correlation values of product and service innovations with user typologies

| Form of innovation | User typologies | | | | | |
|--------------------|-----------------|--------|----------|---------------|--------|---------|
| | Regular | Less | Frequent | Early adopter | Lead | Extreme |
| Product | -0.003 | 0.175 | -0.007 | -0.209 | -0.108 | -0.140 |
| Service | 0.003 | -0.175 | 0.007 | 0.209 | 0.108 | 0.140 |

Table 3 Correlation values of product and service innovations with research approaches

| Forms of innovation | Research approaches | | | | |
|---------------------|---------------------|-------------|---------------|----------------|-------------|
| | Inquiry | Observation | Participatory | Trend tracking | Co-creation |
| Product | 0.331 | 0.013 | -0.344 | -0.369 | -0.067 |
| Service | -0.331 | -0.013 | 0.344 | 0.369 | 0.067 |

the most interesting group ($r = 0.175$). By understanding their behaviors, companies may be able to innovate to answer their needs and turn them to frequent users. Early adopters may not be a subject of interest since they may not be able to represent the broader spectrum of the market ($r = -0.209$). Lead and extreme users are also not recommended. Since they are at the extreme edge, they may be either too sophisticated to provide any insights for today's market or have never consumed the products ($r = -0.108$ and $r = -0.140$, respectively).

On the other hand, service development should rely on early adopters since they possess a stronger desire to obtain new offerings and more knowledge in service usage than others ($r = 0.209$). Therefore, their input can be very valuable. Lead and extreme users can also provide interesting insights but to a lesser extent compared to early adopters ($r = 0.108$ and $r = 0.140$, respectively). Less users should not be considered because they may lack the ability to conceptualise the intangible nature of the service process ($r = -0.175$).

In summary, less users can provide the most interesting insights for product innovation while early adopters are recommended for recruitment if companies want to search for service innovation.

Research approach priorities

Not only the priority of particular groups of

users is given, appropriate research approaches must also be considered according to the form of innovation to be pursued because of the distinct nature of their characteristics. The values in parentheses indicate the correlation value for explanatory purpose as also shown in Table 3.

Product development may require more traditional front-end user research approaches, such as inquiry and observation ($r = 0.331$ and $r = 0.013$, respectively). The two approaches were also among the most used since they consume less time and manpower compared to other approaches.

Service development, on the other hand, calls for a rather active involvement of users in trend tracking, participatory and co-creation ($r = 0.37$, $r = 0.34$, and $r = 0.07$, respectively). Sophisticated tools for such approaches may be required to help users better express their ideas and conceptualize the ideal service processes.

In general, the inquiry approach can be very efficient when conducting front-end user research for product innovation, while participatory and trend-tracking approaches should be considered when searching for service innovation.

LIMITATIONS AND IMPLICATIONS

This analysis, however, covers only the user

screening and research approach aspects of front-end user innovation. Though such findings are extremely useful, other aspects of innovation, such as the level of newness, technology, and companies' characteristics are to be further considered. Analytical aims that lead to sets of questions and analytical techniques that are able to provide better insights must be thoroughly planned. Research within this field still demands further effort in order to complete the new generation of front-end research process.

Integrating recommended user priorities and research approaches into the development of front-end IT research tools can certainly upgrade the innovation process to the next level. According to Gordon, Tarafdar, Cook, Maksimoski, and Rogowitz (2008), information technology can effectively and efficiently help organize and access, mine and analyze, visualize and ideate during the front-end process. As a result, engaging with users in the open innovation era will foreseeably be conducted without boundaries. Companies can get feedback from users in real time and from anywhere in the world. In addition, they can maximize the benefit of information technology to better analyze the patterns and associations among vast amounts of data for more productive results.

CONCLUSION

The matching of user typologies, research approaches, and product versus service innovation can guide companies to effectively and efficiently manage their opportunity identification phase at the front-end of the innovation process. While product development calls for less users, service development should consider early adopters. The inquiry approach can be very efficient when searching for product innovation while service innovation may engage users more deeply with participatory and trend tracking approaches.

This practice can truly engage users in the market of open innovation and maximize the

potential of the process. As a consequence of matching schemes, more innovative products with affordable prices can foreseeably meet users' heterogeneous needs and deliver a better quality of life; in other words, vastly benefit both the companies and customers of the next generation.

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