
User-innovator typologies in co-innovation: from creativity to reality

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Abstract: New product development (NPD) is in its stage of Innovation 4.0, where firms are creating values through Co-innovation. Noticeably, the growing role of customers in NPD since 1990s has made "customer co-creation" become a phenomenon in this innovation evolution. However, customers have been questioned in recent studies about their knowledge, skills, and degree of co-creation. To explicate customers' behaviours and competence in co-innovation, this research will employ 'user-innovators' as the main body of knowledge and examine them in all stages of NPD process. Mixed method will be employed to construct user-innovator clusters, explore their collaborative activities within a co-innovation process, and offer broader perspectives to evaluate an innovation attempt. This study will significantly contribute a new perspective in the literature of innovation management and consumer behaviour whilst seeing users as co-creators in developing a product 'from creativity to reality'.

Keywords: New product development (NPD); Co-innovation; Customer co-creation; User-innovator; Innovation typologies; Innovation attempts; Degree of co-creation.

1. Introduction

‘Innovation has been part of human history in the pursuit of a better quality of life’ (Lee et al., 2012: 822). In its history of evolution, innovation has moved quickly from the stage of ‘Innovation 1.0: closed innovation’ to ‘Innovation 4.0: co-innovation’, when organisations are co-creating values with their stakeholders, especially with the customers (ibid:818). However, customers have been recently questioned for their competence in co-creation activities despite its sizeable contribution in many industries. Researchers have shown concern that customers are only suitable for idea improvement (Crawford & Benedetto, 2011) and in the very last stages of a product innovation process

(Poetz & Schreier, 2012; Lagrosen, 2005). This controversy may stem from a lack of consensus in two key considerations in NPD literature, namely innovation typologies and degree of innovation, which strongly affect the evaluation of customers' performance. Recognising that customers have been either explicated as homogenous groups or analysed with incomprehensive criteria in extant literature (Schweitzer et al., 2014), we decide to conduct this research to gain an insight of their behaviour in NPD, from which we can explain their competence in their co-creation process. This study will employ the concept "user-innovator" to construct the typologies of customers, examine their capability in each stage of NPD process, and investigate in various types of ideas they can contribute. Not only contributing in literature of NPD, co-creation, and customer behaviour, this study is expected to offer findings to help business organisations leverage the customer co-creation to successfully turn a product idea from creativity to reality. In this conceptual paper, we will develop its structure as follows: First, it will provide an overview of the theoretical background from which theoretical arguments and research questions are derived. Thereafter, we describe methodological approach applied to tackle the problems. Subsequently, we will present the key findings of the study and conclude the papers with a discussion of contributions, limitations and avenues for further research.

2. Literature and Development of Research questions

2.1. Customer co-creation in innovation evolution

Aligning with the evolution of co-creation in NPD, the role of the customers in the product innovation process has received increasing attention from both practitioners and academicians. From holding a poor voice in the 1970s, customers are now becoming active players in the value co-creation with joint roles in shaping expectations and co-creating market acceptance for products (Mukhtar et al, 2012). Since 2000s, with a rapid growth of customers' roles in co-creation and their active dialogue with the firms, customers' inputs have become the source of competitive advantage and significantly appreciated in a value chain (Prahalad & Ramaswamy, 2000). Nowadays, customers can also be seen as co-developers or co-creators of products rather than passive users who only produce review on purchase (Mukhtar et al, 2012). The use of customers' competence can be found in many industries with impressive record of value contribution. In the work of Von Hippel (1999:4), a primary role of customers is recorded in 82% major functional improvements in scientific instruments, 85% major pultrusion-processing machinery innovation, and 100% first type used commercially in semiconductor or electronic process equipment.

2.2. Considerations in co-innovation: Innovation typologies, degree of co-creation, and customer typologies

Despite ample research on customer co-creation, the competence of customer has recently been questioned in terms of the innovativeness of ideas contributed and the degree of co-creation in an NPD process. Researchers have raised their concern that customers have no or little expertise knowledge, contribute less feasible ideas compared to professionals (Kristensson et al., 2004), or are more suitable with proposing ideas for product improvements rather than new-to-the-world products (Crawford 2011:110). Furthermore, the involvement of customers in NPD stages, especially in ideation, is 'increasingly discussed in innovation science and practice' (Fuller et al., 2012:155).

Before explicating these arguments, it is pertinent to clarify two key considerations that significantly affect the way to classify customers in co-creation activities, namely innovation typologies and degree of co-creation. First, it should be noticed that innovation has a broad definition, ranging from technological breakthroughs or even ‘a simple new way to do things’ (Lee et al., 2012:818). Whilst some researchers employed the newness of product or technological disruption as criteria to distinguish innovation as radical, incremental, breakthrough, or new-to-the-world innovation, others may view it from various innovation attempts. Currently, researchers have started looking at different dimension of ideas to distinguish innovation attempts into major innovation, minor innovation, commercially attractive innovation, positive societal impact, technology dependency, or technology feasible (Schweitzer et al., 2014; Schoormans et al., 1995). Regarding degree of customer co-creation, it is suggested that firms achieve their highest level in their scope of collaboration with customers once they allow their customers to get involved in these all stages (Hoyer et al., 2010). Despite a sizeable number of studies on NPD models, most of findings mainly contain these four core stages: idea generation (ideation), concept development, product testing, and commercialisation launch (Hoyer et al., 2010; Ulrich and Eppinger, 2004; Cooper, 2001; Boer, 1999; Kagioglou et al., 1998).

However, existing studies are less likely to cover all stages whilst examining customer co-creation (Lagrosen, 2005). Many studies treat customers as homogenous (Schweitzer et al., 2014; Poetz & Schreier, 2012), or lack of nuance in trait-based approach to analyse them. The first and most popular concept in NPD literature should be the lead-user theory (Piller et al., 2011), which describes users in open innovation as customers with needs and high benefit related to innovation (von Hippel, 1986). However, lead-users are likely suitable for commercially attractive innovation (Bosch-Sijtsema & Bosch, 2014) and only active in the last two stages, (Belz & Baumbach, 2010; Morrison et al., 2004; von Hippel, 1986). Another perspective to understand customers in co-creation is to look at them as users with domain specific knowledge (Schweitzer et al., 2014; Hoffman et al., 2010; Schoormans et al., 1995). Although NPD research started seeing them as heterogeneous groups (Schweitzer et al., 2014:155), existing studies are lack of attributes in criteria for categorisation and call for further studies to obtain a more nuanced understanding of other trait-based factors. Moreover, their findings are yet inclusive since customer contribution is mainly examined in only ideation stage (Schweitzer et al., 2014; Hoyer et al., 2010) or concept testing stage (de Bont & Schoorman, 1995). Another research trend in NPD literature has investigated in a concept called user-innovator (Stock et al. 2014; Bogers et al., 2010). Referring to the customers who can innovate themselves (Bogers et al., 2010), user-innovators are the first to ‘design for use, and test for use’ (Baldwin et al., 2006) and distinctive from ‘user purchasers’ (aka. lead users) who are the first to move in innovation adoption (ibid.). A study by Stock et al. (2014) has presented an association between user-innovator’s personality traits and their co-creation potential in collaborative NPD. They suggested that customers with ‘Openness to experience’ and ‘Extraversion’ trait will be more likely to have new ideas whilst people with ‘Neuroticism’ and ‘Conscientiousness’ will be more active in commercialisation stage. However, their findings still called for a more holistic study with greater nuance in traits and application as personality traits should not be the only attribute that can explain the competence of customers in co-creation activities.

2.3. The gap in customer co-creation literature

Whilst the controversy around customers’ competence in co-innovation can be explained by gaining insight of their behaviours in NPD process, existing studies have not fulfilled

this expectation. Therefore, a study that treats customers as heterogeneous groups, looks at their behaviours from a holistic approach, and investigate in how they engage in all stages and in various innovation attempts will deserve a firmer explication.

Within this study, we will adopt the concept user-innovators (Stock et al., 2014) as the main body of knowledge to tackle this problem. Inputs of user-innovators in all stages of NPDP process, including ideation, concept development, product testing, and commercialisation will be evaluated. Furthermore, this study will also approach innovation definition (or innovation attempts) from customers' point of view with a broad perspective. Therefore, we will break down the main research problem into three research questions as follows:

- Q1. What are the typologies of user-innovators in co-innovation?*
- Q2. What is the link between typologies of user-innovators and NPDP stages?*
- Q3. Which type(s) of innovation attempts that each typology of user-innovators most likely produces ideas for?*

3. Research design

3.1. Methodological approach

We employ mixed method and carry out a two-phase investigation for this research. In the first phase, we will conduct a qualitative study to generate description and understanding of the user-innovators' behaviours and the situation. Since study on behaviours should be an investigation of everyday social life in situ, we will adopt participant observation technique (Prager, 2012; Atkinson & Pugsley, 2005), followed by an in-depth interview to gain thick description and insightful knowledge of the subject and the situation (Silverman, 2004; Robson, 2002). Variables, measures and constructs gathered from the first phase will be applied into the quantitative study in the second phase.

3.2. Choice of sampling

In the first phase, we choose convenience sampling to generate exploratory findings and rich content for the research. Participants will be users recruited for a co-creation project held by IBM and a Robotics project run by researchers in University of Birmingham (UOB). Although the process of sample selection may be questioned for self-selection bias, the projects chosen in sampling have their expressive value. IBM is one of the market-leaders in high-technology industries that is famous for its customer-centric strategy (Chesbrough & Crowther, 2006; Prahalad & Ramaswamy, 2002) and has achieved much success from customer co-creation activities (Chan & Putsis, 2015; Gawer, 2014; Aaker, 2012). Regarding the Robotics project, the researchers are looking forward to innovation that is user-friendly with the market. Hence, they expect customer co-creation may evoke new approaches to innovation attempts including 'friendly patrolling' (Shiomi et al., 2014; Lourens & Barakova, 2011) or 'anthropomorphic innovation' (Shea, 2014).

Whilst in the first phase, the number of participants may be around 20, we expect to have a larger sample in the second phase. At this stage, we do not suggest any preference of industries since our main focus is to recruit user-innovators. This means that we will have screening questions to ensure that only participants who have had one or some innovation

activities in the last three years (regardless the level of innovativeness and industries) will be eligible as user-innovators to join our research.

3.3. Phase of exploration

The first phase may last for weeks or months, according to the project fieldwork. We will record activities of participants whilst they are engaging in the co-creation process, evaluate their performance, and develop an in-depth interview. Analysis will be performed simultaneously along with the data collection but further analysis will occur at the end of the process. First analysis on typologies and their completion in each stage will take place before the in-depth interview occurs and be explicated by experts (IBM project leaders and the UOB researchers). Questions in the interview step will be kept semi-structured under specific themes based on extant literature about personality traits of user-innovators, domain specific knowledge, and lead user theory.

Exploratory findings in this phase are helpful in suggesting the most comprehensive terms to be used in the questionnaire launched in the second phase (Pope & Mays, 1995:44). In addition, qualitative analysis is also a part of the approach to examine this particular phenomenon (ibid.) whilst it may suggest variables for quantitative test in the second phase.

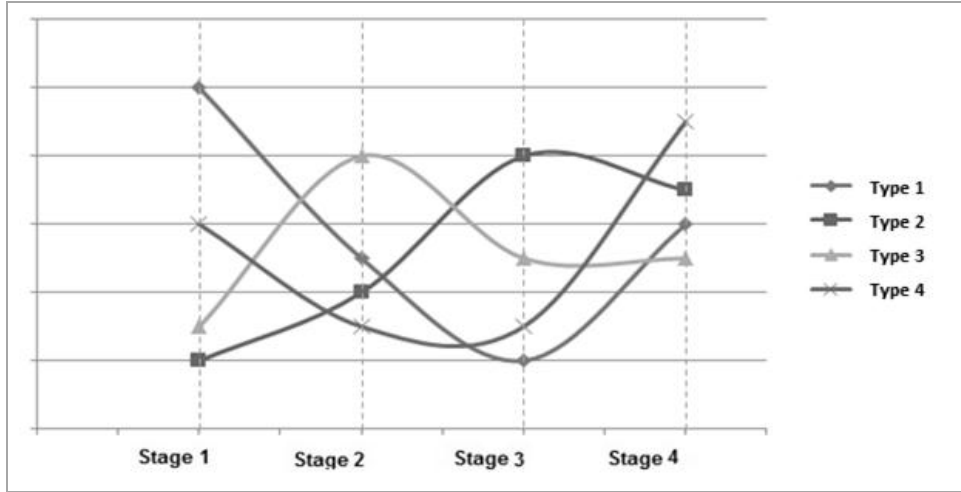
3.4. Phase of explication

This phase may be conducted via a cross-sectional study in which participants will complete self-completion questionnaire or respond to the survey with instruction from the researchers. Provisionally, after screening questions, each dimension of typology construction will be measured on a Likert scale. The survey will also require respondents to describe their co-creation activities in each stage and how successful they were, from their opinions and from the firms' opinions, if possible. Furthermore, questions about innovation attempts that they assume as important for a NPD will also be designed under multiple-choice format. Analysis will be subsequently conducted to seek for a generalisability of findings. To identify typology construction in Q1, we may first deploy factor analysis to collapse a large number of variables into a few interpretable underlying factors (Passini, et al., 2014, Bryman, 2012), then conduct cluster analysis to categorise them into different groups. The association between user-innovator typologies and their completion in NPD stage in Q2 can be explained through correspondence analysis or correlation test. Regression may also be a relevant test within the scope of this study. Similarly, relationship testing can be performed to answer Q3.

4. Expected scope of findings

This study is expected to respond to the research question by profiling the user-innovators and explaining their competence in co-creating values in a full NPD process. First, analysis on user-innovators' behaviours will be drawn upon main constructs of trait-based approach, domain specific knowledge, and lead user theory. Second, with the mixed method, this study may suggest a perceptual map explaining how user-innovator involvement varies in four different NPD stages. In **Figure 1**, we use separate lines to represent each typology of user-innovator in a co-creation process. From our prediction, the competence of each typology at each stage will vary distinctively, thus the lines in the perceptual map may follow polynomial regression model rather than linear model.

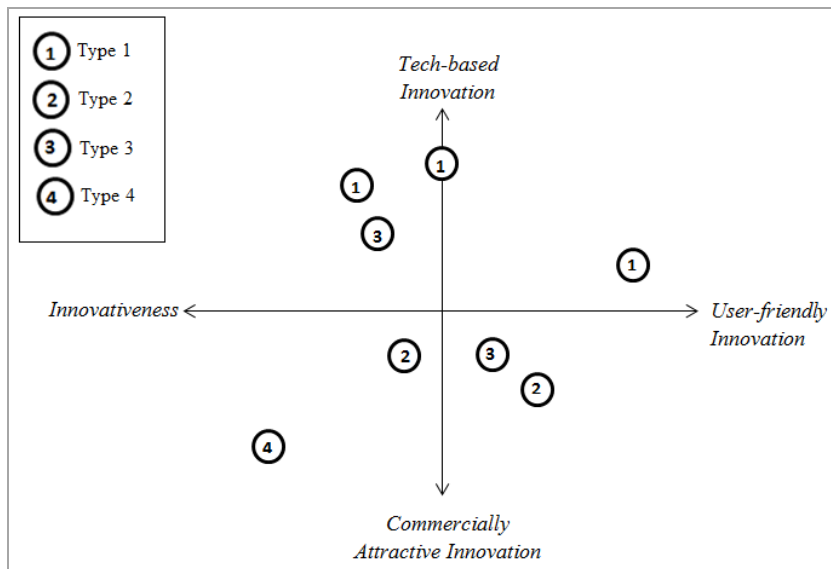
Figure 1: Perceptual map of user-innovators' involvement in different NPD stages



Source: The authors (2015)

The third finding is an explanation of types of ideas that different clusters of user-innovator may contribute. We demonstrate our expected finding through a conceptual framework in **Figure 2**, in which each user-innovator type is plotted differently towards various types of innovation attempts. The basic concept of this framework is that different groups of user-innovators will have different capabilities in contributing ideas. Whilst a particular type of user-innovators may be able to contribute idea for only one particular type of innovation, others may be capable to suggest ideas for many innovation attempts.

Figure 2: Conceptual framework of competence of different user-innovator types



Source: The authors (2015)

Besides the findings generated from statistical analysis, this research may provide a few of exploratory findings. From our expectation, the study will present new quality dimension of ideas in innovation from a new perspective. It may also imply how users can be motivated, inspired, and assisted to contribute better inputs during the co-creation process. This should be considered to have a considerable meaning since existing NPD literature has found that in certain contexts, knowledge can be tacit and sticky to transfer from users to producers (Bosch-Sijtsema & Bosch, 2014)

5. General discussion

5.1. Contributions of the study

From the expected scope of findings, this study is expected to yield both theoretical and practical implications. First, it contributes to the consumer behaviour literature whilst seeing customers as co-developers in a value creation context instead of purchasers in a buying process. In co-creation innovation literature, this study should be the first to investigate in user-innovators' behaviours from a holistic approach, from which different dimensions of typology construction are drawn together. Moreover, this study offers a pivotal contribution in innovation literature whilst moving away from traditional approach to explore innovation identification from a broader perspective.

Practitioners may also gain significant benefits from this study. By understanding customers' typologies from the early stage, the business organisations can strategically recruit, engage, allocate, and manage participants in accordance with their innovation purpose. In this regard, the cost and risk of collaborative innovation can be controlled whilst the co-creation competence of customers can be leveraged more effectively. A close look at customer co-creation in a full NPD process also allows firms to provide better communication platforms, or toolkits to support their customers to turn an idea from creativity to reality.

5.2. Limitation and future research

As with any piece of research, this paper may contain weaknesses. Participant observation may not be a convenient technique for any researcher to conduct due to the availability of the field projects and the level of engagement that the researchers are empowered. Furthermore, this technique may be questioned of its subjectivity from both methodological approach and practical approach. However, subjectivity is one of the misconceptions about participant observation (Atkinson & Pugsley:232). As researchers, we will only make document records of what we can observe, thus we only record and work with observable and recordable data (Madison, 2011; Huspek, 1994). Should one raise concern that our experience may influence the outcomes of participants during co-creation process, we may suggest that our background and experience for years in NPD, in both academia and practice scenarios, can be considered as an advantage since it allows us to immerse into the field quickly and more effectively. In addition, the findings will also be explicated by experts (the Robotics project leader and IBM representatives), which means we can increase the validity of this study.

It is important to recognise that the challenges in research implementation should be outweighed by the contribution and the direction of future research that this study can offer. With a focus on the customers' journey of co-creating value in a full innovation

process, this study may provoke a new attempt in innovation, or inspire the next researchers to investigate in experiential innovation in exclusive applications. In addition, this research may open avenues for future research on platforms to leverage cross-industry innovation.

5.3. Conclusion

This paper has presented the controversy around customers' competence in co-creation process stemming from the complexity of concepts in NPD literature. By breaking down the main problem into three research questions, we develop our research through gaining insight of customers by categorising them into different user-innovator typologies, then examining the association between each typology and NPD stages. This research also highlights that heterogeneous groups of users are differently predisposed to produce ideas for various types of innovation, which drives us to a relationship testing between each type of user-innovator and types of innovation attempt. The mix method approach is conducted to offer conclusive evidence of how users' capability varies in each stage of NPD process as well as exploratory findings including user-innovators' behaviours and new approach to define innovation. The study has significant contributions in literatures of NPD, co-creation, and consumer behaviours and suggests many practical applications for business organisations. In addition, this study also provides avenues for further research in experiential innovation and cross-industry innovation from customers' expense.

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