

A Novel Framework of Consumer Co-creation for New Service Development

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Abstract. Consumer co-creation can be seen as an attractive approach for companies for a variety of reasons. In particular, ideas generated through co-creation will more closely mirror consumers' needs. Additionally, in Web 2.0, the consumers can be easily post their consuming article on the Internet. In the present study, we develop a new consumer co-creation framework: obtaining consuming data from the Internet, and using Grounded Theory (Strauss and Corbin, 1998) based Human-Centered Computing System (Hong, 2009) to investigate consumers' needs or creations and to aid the company designing new products or services.

Keywords: Co-creation · Consuming tribe · Lead user · Innovative idea

1 Introduction

The present study attempts to develop a new consumer co-creation framework for exploring innovative ways of designing new products: using Google blog search to obtain relevant consuming textual data and applying Grounded Theory along with the social identity theory, self-categorization theory (Oakes 1987, Ashforth and Mael 1989), and social presence (Shen and Khalifa, 2007) to do self-categorization to discover the innovative value of a product by using co-occurrence analysis method, such as using social identity to identify the underlying knowledge and innovation or weak tie.

As discussed earlier, lead users are important partners when a company attempts to create innovative products. But the problem is that before companies attempt to design an innovative product, they hardly know who the lead user is (Etgar 2008; Franke, Keinz, and Steger 2009). Fortunately, especially in the era of web 2.0, it is quite easy for consumers to upload what they have written down about their consuming value to the Internet. In the present study, the researchers believe that very much consuming information is posted on the Internet. Although the virtual world might not be similar to the physical society, it may be easier, more effective and less costly to identify a trend or a framework created by innovative lead users on the Internet than the traditional method may.

Finally, the researchers used a case study, the Tsmsui travel plan, to demonstrate that the innovative values discovered by using the new consumer co-creation framework, which is similar to lead users in the physical society, to help or test authors how to get good results to evidence our method is useful.

2 Literature Review

2.1 Informational Social Influence, Grounded Theory (GT) and Qualitative Chance Discovery

The weak tie (bridge) is generally not so closely connected with other clusters, and it gives a different piece of information. Then depending on the organization of different clusters, researchers may find short cuts (bridge, weak tie or friends of other groups) between different clusters and the short cuts, in turn, can bring potential innovation. Therefore, rare association analysis can be used to identify purchased goods with low support and high confidence and is also used to solve the problem of low frequency, it still fails to link with future trend analysis until Ohsawa et al. (1998) proposed the KeyGraph algorithm. KeyGraph algorithm is used to calculate the frequency of the node in the shopping cart and that of the co-occurrence of two nodes, in which strong clusters are expected to emerge. Next, the key-value derived from all the nodes connecting to each other is calculated. Among the strong clusters, we may find nodes with high key values and low frequency, which are called chance nodes. Then the researcher may integrate the hints given by chance nodes and strong clusters to build a chance scenario, which is called chance discovery.

The above discussion describes an uncertain scenario: before the researcher who follows the steps can identify relevant clusters, organize the clusters, and choose the weak tie or strong tie to reveal chances, he or she has to read and comprehend a mass of relevant theories, such as the GT. Therefore, the researcher not only has to do qualitative analysis to define the objective words but also has to decide on the constraints. Then these objective words and constraints are entered into the information retrieval system to extract small but enough precise and meaningful data, like Grounded-theory-based chance discovery (Hong, 2009).

2.2 Consumers Co-creation in New Product Development (NPD)

Involving consumers in the NPD process can improve product quality, reduce risk, and increase market acceptance (Business Wire 2001). Therefore, ideas generated through co-creation with customers will more closely mirror consumers' needs. It has been clearly recognized that successful NPD depends on a deep understanding of consumers' needs and product development efforts that meet those needs (Hauser, Tellis, and Griffin 2006). However, by involving consumers more actively in the NPD process, new ideas for a product can be generated, which are more likely to be valued by consumers, thereby increasing the likelihood of success of a new product.

Then, in the consumer co-creation process, the firms need to identify the consumers or consumer tribes who have the highest potential for co-creation (Ernst, Hoyer,

Krafft, and Soll 2010; Franke, Keinz, and Steger 2009), and, then, they can recruit those valuable customers to form a larger group of consumers in the co-creation process. This is to explore whether a larger group of people can lead to successfully customizing the product or focusing on a smaller particular group of customers, such as lead users can be more effective in developing and marketing a product. Co-creators need to be those who perceive themselves highly involved and knowledgeable consumers who often differ significantly from the majority of consumers and the majority of consumers may eventually purchase the product. Again, we need a better understanding of the needs, wants, preferences, and motivation of different groups of co-creating consumers. Therefore, one of the underlying issues of consumers' co-creation is that finding early adopters or lead users from the market is very difficult and the cost to do the search can be very high.

Therefore, to explore innovative ways of designing new products, we integrated GT, informational social influence, social presence (Shen & Khalifa, 2007), and text mining to define the objectives and constraints to extract relevant data and did co-occurrence analysis to obtain innovative ideas. The new consumer co-creation framework will be described in the next section.

3 Methodology

To achieve the goal of discovering innovative ideal, the researchers of the present study developed a new consumer co-creation framework for exploring innovative ways of designing new products: using Google blog search to obtain relevant consuming textual data and applying GT along with the social identity theory, self-categorization theory (Oakes 1987, Ashforth and Mael 1989), and social presence (Shen and Khalifa, 2007) to do self-categorization to discover the innovative value of a product by using co-occurrence analysis method, such as using social identity to identify the underlying knowledge and innovation or Deutsch and Gerard's (1955) theory of informational social influences (SI) that may lead humans to conform to the expectations of others. The research flowchart is shown as follows.

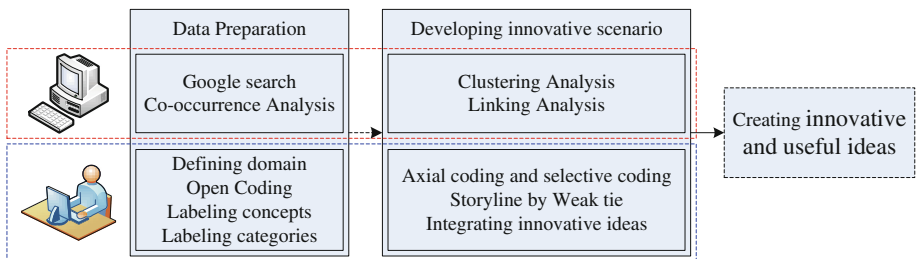


Fig. 1. Research flowchart

3.1 Human-Centered Computing System (HCCS)

The researchers realize that only a limited number of lead users existing in whole society, and they always use their informative social influence; for example, they may show their creativity by using innovative products in new ways and share them with the majority voluntarily to earn their social status. That is, either in the physical society or in the virtual community only little innovative consuming information can be found from lead users, and the little information is mixed with most of the consuming information. In the present study we used GT and employed a text-mining method to develop a HCCS for creating an alternative innovation. We followed the steps listed below in our research process.

Phase 1: Preparation for Data and Initial Analysis

To create a new innovative scenario, the researchers first collected data relevant to innovative uses of a product to extract useful data and then combine GT with text mining to process the data. The detailed process is listed as follows: H labels indicate the steps to be done by human beings, and C labels indicate the steps to be done by computer systems.

Step 1: Processing the raw data.

1-1-1H) The researcher defines the domain and relevant key words he/she intends to study.

1-1-1C) The researcher selects the data corresponding to keywords from the Internet.

1-1-2H) Based on his/her domain knowledge, the researcher interprets the texts, and at the same time, segments texts into words, removes irrelevant words, and marks meaningful words with conceptual labels.

Step 2: Word co-occurrence analysis (open coding).

1-2-1C) Use equation (1) to calculate the association values of all relevant words as shown below:

$$\begin{aligned}
 &N \text{ is all words} \\
 &i = 1 \text{ to } N - 1 \\
 & \quad j = i + 1 \text{ to } N \qquad \qquad \qquad (1) \\
 & \text{assoc}(w_i, w_j) = \sum_{s \in allD} \min(|w_i|_s, |w_j|_s)
 \end{aligned}$$

In the above algorithm, s stands for the co-occurrence of words in the sentence, and D stands for all textual data.

1-2-2C) To visualize the analysis result, the computer system can reveal an association diagram showing the association among the co-occurrence words.

1-2-1H) The researcher identifies keywords as concepts and the clusters as categories derived from the co-occurrence association diagram, which helps the researcher preliminarily figures out the various theme values presented in the data.

Phase 2: Developing the Weak tie Storyline to Process Innovative Scenario

Based on the analysis done in phase 1, in which the researcher discovers various innovative ways of using ideas, clusters can be developed from data provided by lead users (axial coding), and the researcher draws a storyline based on links, using clusters developed by the innovative ideas to design an advertising scenario to improve the information social influence (selective coding).

Step 1: To generate uses of innovative product clusters (Axial coding)

Based on the focus of “rare but meaningful” uses of innovative ideas, the researcher extracts the sentence data to create a scenario of how the products are used innovatively. The process is illustrated as follows.

2-1-1H) The researcher needs to define what the uses of innovative products ($w_{innovation}$) are.

2-1-2C) Innovative product use ($w_{innovation}$) extracts out some rare but meaningful sentences. This variable is used to confirm the theme and to remove irrelevant sentences with a view to narrowing down the data range and to sifting out valid sentences. That is, valid sentences must include words related to $w_{innovation}$, which is shown as equation (2).

$$i = \text{first sentence to the last sentence}$$

$$\text{valid sentence set} = \text{if}(\{w_1, w_2, \dots\}_i \cap \{w_{innovation}\}) \neq \phi \quad (2)$$

2-1-3C) Use equation (1) to calculate the association value of all words in the set of valid sentences, and then create an association diagram.

Step 2: Link innovative ideas (weak tie recognition) to extract uses of these products from the lead users’ (selective coding).

The process is listed as follows.

2-2-1H) The researcher needs to decide what the various uses of the innovative ideas are: ($w_{innovation_1}, w_{innovation_2}, \dots$).

2-2-2C) Various innovative ways of using ideas ($w_{innovation_1}, w_{innovation_2}, \dots$) extract the rare but meaningful sentences.

$$i = \text{first valid sentence to the last valid sentence}$$

$$\text{use of innovative product set}$$

$$= \text{if}(\{w_1, w_2, \dots\}_i \cap \{w_{innovation_1}, w_{innovation_2}, \dots\}) \neq \phi \quad (3)$$

2-2-3C) Use equation (1) to calculate the association value of all words in terms of innovative uses of ideas, and then create an association diagram.

2-2-2H) Based on his/her domain knowledge, the researcher identifies the lead users’ innovative uses of ideas to create the advertising scenario.

4 Case Study

Phase 1: Preparation for Data and Initial Analysis

Because the information is introduced for Taiwanese, only weblog written by Taiwanese is valid. So, the authors collected data posted on blogs relevant to Tamsui travel and Tamsui holiday by Taiwanese. These data ranged from January 1, 2011 to December 31. Using Google blogs (<http://blogsearch.google.com/blogsearch>) and the keywords are “Tamsui travel” or “Tamsui holiday”, to search for the data, the authors obtained 218 related data from blog articles. Here, we try to prove that innovative idea discovery based on the phase 1 of HCCS is useful for creating innovative service.

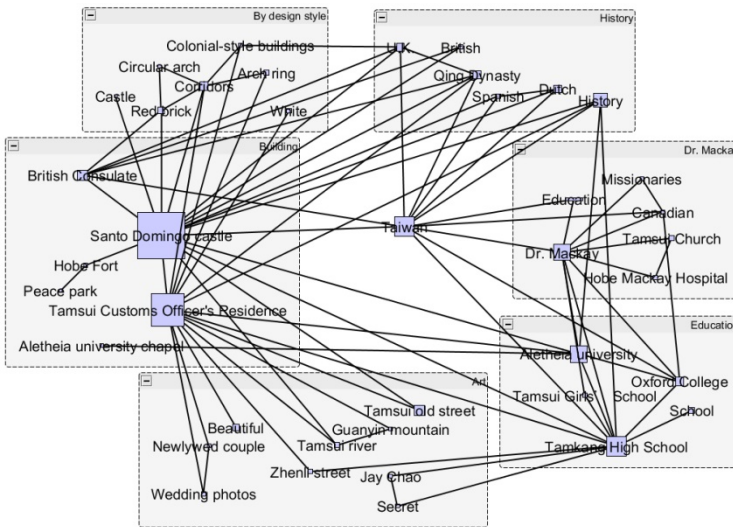


Fig. 2. Visualizing the travel characteristics of Tamsui

Phase 2: Developing the Weak Tie Storyline to Process Innovative Scenario

Step 1: To generate uses of innovative product clusters (Axial coding).

In this step, each place is not only presents the characteristics of landscape and building style, but also helps authors to integrate the related clusters (graphs) to clearly sketch the whole innovative scenario. First, after analyzed the results of phase 1, the authors can identify some important places, such as Santo Doming castle, little White House, Oxford college, Tamkang high school. Then, the characteristics of each graph are presented in following:

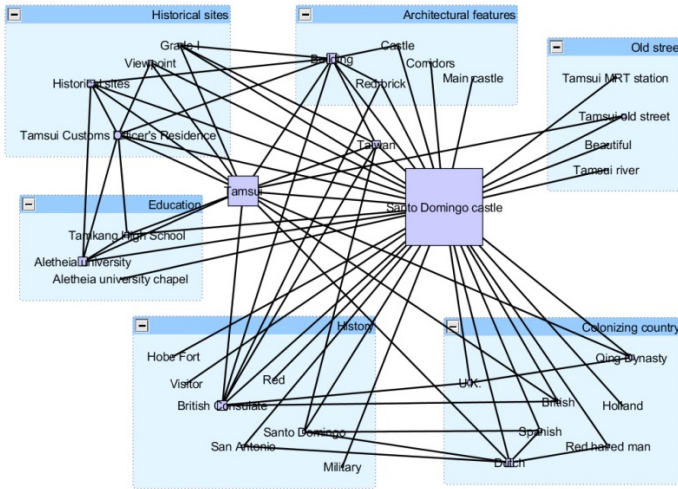


Fig. 3. The characteristics of Santo Doming castle

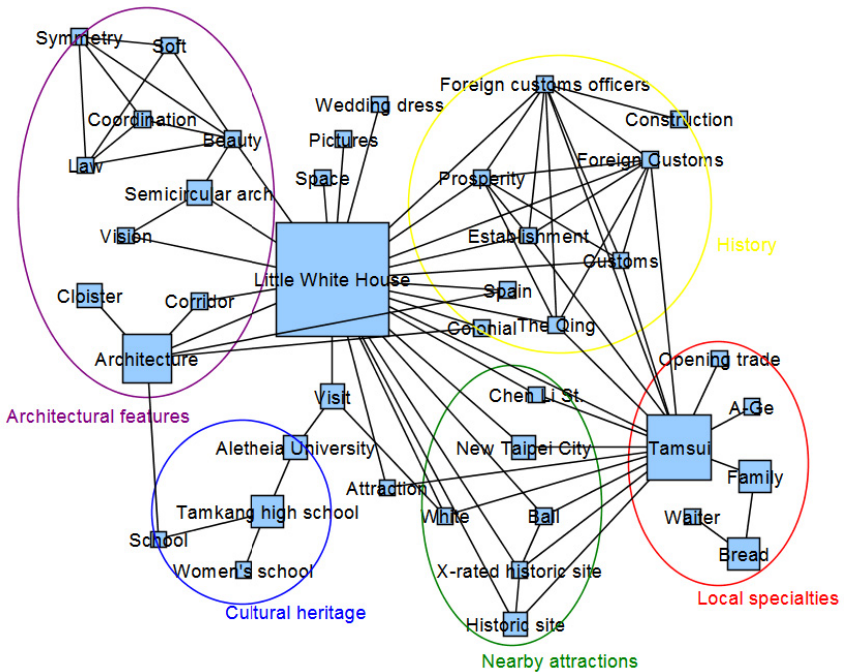


Fig. 4. The characteristics of Little White House

In Fig.3 and Fig.4, authors could recognize that the garden, carved statue, spire, corridors, arch et al., are presented in everywhere of Santo Domingo castle and little White House. The European culture is very rich in there. Therefore, the visitors always take a photo in there. Especially, in spring the flours of cherry bloom.

garden, European culture, is an important concept of storyline for travel design. The other is the Dr. Mackey who was a pioneer of medicine and education in Taiwan, brought a great medical technique to Taiwan and helped Taiwanese to leave the diseases. So, Taiwanese visit Tamsui is not only enjoy in European culture, but also can memory Dr. Mackey.

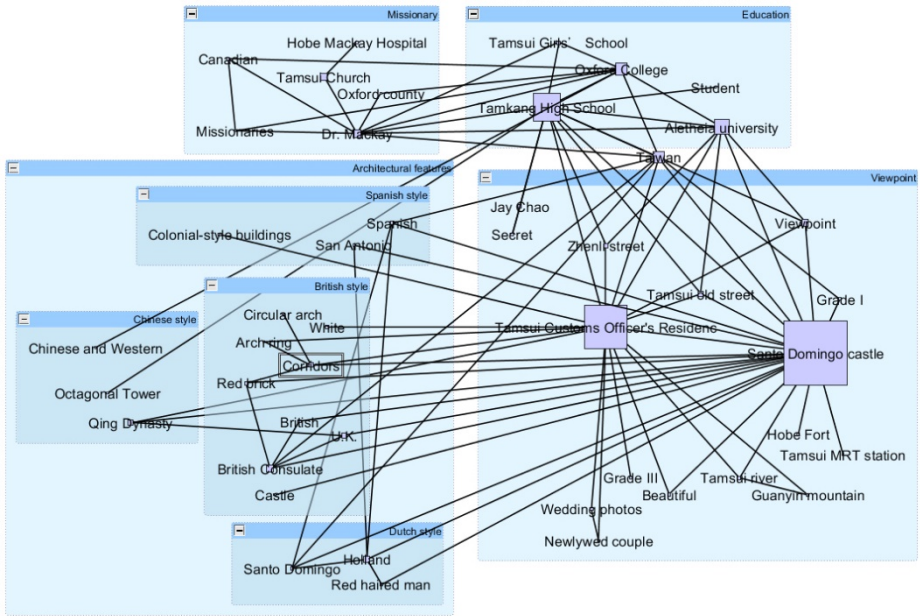


Fig. 6. The characteristics of Tamsui, spring, and Oxford College

5 Conclusion

Consumer co-creation model is one of important methods for company to develop new product. But how to discover and invite useful consumers into brainstorm meeting is a big problem of this method. Therefore, this study proposes an innovative co-creation method; collecting consuming data from internet, the HCCS is used to analyze the consuming data for discovery innovative ideas, and help experts to design a new product. At last, the Tsmsui travel plan is used to help or test authors how to get good results to evidence our method is useful.

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