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MINING MARKETING KNOWLEDGE TO EXPLORE SOCIAL NETWORK SITES AND ONLINE PURCHASE BEHAVIORS

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□ *Social network sites (SNS), as web-based services, allow users to make open or semiopen profiles within the systems they are part of, to see lists of other people in the group, and to see the relationships of people within different groups. As the development of Internet applications has matured, developing and evaluating business models on social network sites has become a critical issue because these sites can be an innovative source for online marketing. Most studies in Taiwan on the behavior or marketing on SNS focus on either advertising or marketing, without picturing the overall scenario. Thus, this study investigates SNS as a research subject, and explores users' online and purchase behaviors in the cybercommunity. For this, the study uses the Apriori algorithm as an association rules approach, and cluster analysis for data mining, to categorize four kinds of online user behavior and generate purchase behavior patterns and rules. The results suggest that online users' SNS and purchase behavior knowledge are critical for the development of online business models.*

INTRODUCTION

Social network sites (SNS), as web-based services, allow users to make open or semi-open profiles within the systems they are part of, to see lists of other people in the group. The terminologies and structures of such communication networks differ among sites (Boyd and Ellison 2007; Litt 2013). Social networks refer to composites of large numbers of individuals in groups, as well as the interactions and relationships that exist among the groups and individuals (Iacobucci and Hopkins 1992; Khong, Onyemeh, and Alain Chong 2013). Marketers rely on social networks to spread marketing messages in both business-to-business (B2B; Mouzas 2006) and business-to-consumer (B2C; Brown and Reingen 1987) markets. Individuals in social networks act as business communication channels (Ryu and Han

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2009; Lynch, Schwerha, and Johanson 2013) to disseminate and exchange information (Brown and Reingen 1987; Yu, Venkatraman, and Singh 2003). Social networks influence consumer behavior in various aspects, such as information-search strategies, decision-making processes, and consumption decisions (Flynn, Goldsmith, and Eastman 1996; Payr 2001; Huang and Kuo 2012). Therefore, social networks are an extremely important channel for virtual community marketing. Online society is a new community with a high degree of commonness and relevance. But relationships among people require certain keys and time to hold together, and in the online world, links that are only very weak among individuals can build a group (Tan and Thoen 2000). A business can choose to maintain an old relationship or choose to create a new relationship, a new group with its customers. However, in addition to sales promotions, enterprises should follow a broader business model development on SNS.

Recently, the emerging channel of social network marketing (SNM), such as Facebook, Twitter, Epinions, and Line, has attracted the attention of marketing practitioners and researchers. These sites not only permit users to express comments and opinions on products, people, organizations, and many other entities, but also enable users to build various social relationships. With these social relationships, opinions will have greater impact on users than those expressed on other channels (such as shopping websites) because people believe or more easily accept the opinions of those with whom they have social relationships (Xu et al. 2012; Kim 2013). In addition, the influence of opinions on SNM can be disseminated more widely and quickly than on other channels. Thus, some user opinions captured on SNM can greatly influence other users' buying decisions or their views on certain companies.

Thus, many business entities have recently come to recognize this phenomenon, and some companies have begun to identify certain users of SNM for conducting online marketing and reputation management (Tsvetovatyy et al. 1997; Miller and Dickson 2001; Scharl, Dickinger, and Murphy 2005) in e-commerce and e-business. For companies to better utilize SNM for cost-effective, targeted marketing and reputation management, they must address two important questions: How to relate to the huge number of SNS users, given their limited budgets? Which users' opinions will most influence others' actions? If the most influential group of target users could be identified, companies could use minimal resources to improve product sales and enhance their reputations (Xu et al. 2012; Ma and Wang 2013; Redmond and Cunningham 2013; Okori and Obua 2013; Yan, Wu, and Tu 2013). According to a survey in *Business Next Magazine* (Lo 2012) 25% of the top 100 Taiwanese websites% are community-type sites (blogs, microblogs, networking sites, Internet forums, instant messaging, and Internet games,

etc.) and account for the largest category. *Wretch* was the top site, with *Facebook* being second. The microblog "Plurk" first gained a good performance, winning the 23rd place. This indicates that there is space for the development of online activity patterns and online communities for further online marketing (Lo 2012).

In contrast to traditional direct marketing, SNM recognizes that links between consumers exist. With the gigantic databases of customer information available today, companies now are able to target their customers by taking into account their interrelatedness. Traditional marketing research does not reveal these social connections between consumers and thus cannot take advantage of links between customers. These interdependencies are measured through implicit links (e.g., matching on demographic attributes, geographic links, etc.), or through explicit links (e.g., communications between actors, family ties, etc.) (Hill, Provost, and Volinsky 2006). Although SNM offers clear advantages over the direct marketing business model, the use of social network information and knowledge in predicting consumer behavior is still a very recent issue (e.g., Hill, Provost, and Volinsky 2006; Manchanda, Xie, and Youn 2008; Benoit and Poel 2012).

In addition, among the new techniques developed for business intelligence, data mining is the process of discovering significant knowledge, such as patterns, associations, changes, anomalies and significant structures from the large amounts of data stored in databases, data warehouses, or other information repositories (Hui and Jha 2000; Keim et al. 2004; Cheng and Sun 2012; Liao, Chen, and Yang 2013). In the literature, there are many data mining models such as classification, estimation, predictive modeling, clustering/segmentation, affinity grouping or association rules, description and visualization, as well as sequential modeling. Similarly, there are also many application methods, including association rules, sequential patterns, grouping analysis, classification analysis, and probability heuristic analysis (Berson, Smith, and Thearling 1999; Mehta and Bhattacharyya 2004; Musaev 2004; Liao 2005; Liao, Chu, and Hsiao 2012; Winder et al. 2013). Knowledge of SNS users extracted through data mining can be investigated for business model and SNM knowledge derived from research and then provided to SNS businesses, thereby serving as a valuable reference for the building of their profit model.

This study investigates various Taiwanese user experiences on SNS. Their degrees of confidence were often demonstrated by word-of-mouth disseminations about the social network site. Further, this research looks at how the reputations of SNS proprietors and their affiliates were disseminated through relationship marketing for formulated SNM in its business model concerns. Based on these considerations, the purposes of this research can be simplified as follows: (1) to segment SNS users by their online community information utilization behaviors; (2) to explore different behaviors of

SNS users, discovering their participation motivation as related to retention; (3) to explore different behaviors of SNS users, finding the relationships among the means of gaining information, the intention to purchase products, and the choice of purchasing channel; (4) to explore possible tools and methods for marketing approaches by the different SNS behavior segmentation; (5) to devise an effective service mechanism for developing an integrated SNM model.

The rest of this article is organized as follows. "Research Design" introduces the proposed system framework, system architecture, database development, and questionnaire design. "Data Mining" introduces the data mining approach, including the association rules and cluster analysis. "Data Mining Results" presents the data mining process and the analyzed results. "Managerial Implications" describes research findings and discusses the implications of and for management. Finally, a brief conclusion is presented.

RESEARCH DESIGN

Research Framework

The research framework in this study is shown in Figure 1, where it delineates the outline of a questionnaire tracing the behaviors of SNS users when using the site's interactive tools to share information. The questionnaire promoted the collection of data, which was later compiled into a comprehensive database for analyzing the utilization behaviors of SNS users. The researchers began by conducting an actual field study on the behaviors of SNS communities, from which preliminary and secondary data were collected. Specific database requirements were considered. The returned questionnaires collected data that embodied the architecture of the databases, and the constructed databases were used to categorize users by their behaviors as shown by the collected data. Apriori algorithm association rules were employed for analyses to investigate the analogy and disparity characterized by the inherent behaviors of SNS users. Based on this, proposed marketing strategies for the SNS community were developed.

System Architecture

The system architecture of this research is shown in Figure 2, which comprises three distinct databases: *Tool Utilization Behavior Database, Information Participation Database, and Consumer Preference Database*. These three databases translated into the two features in the data market. These two features represented the *Information Source and Purchased Items* and the *SNS Community Utility Operative Attitude*. The data market was processed by

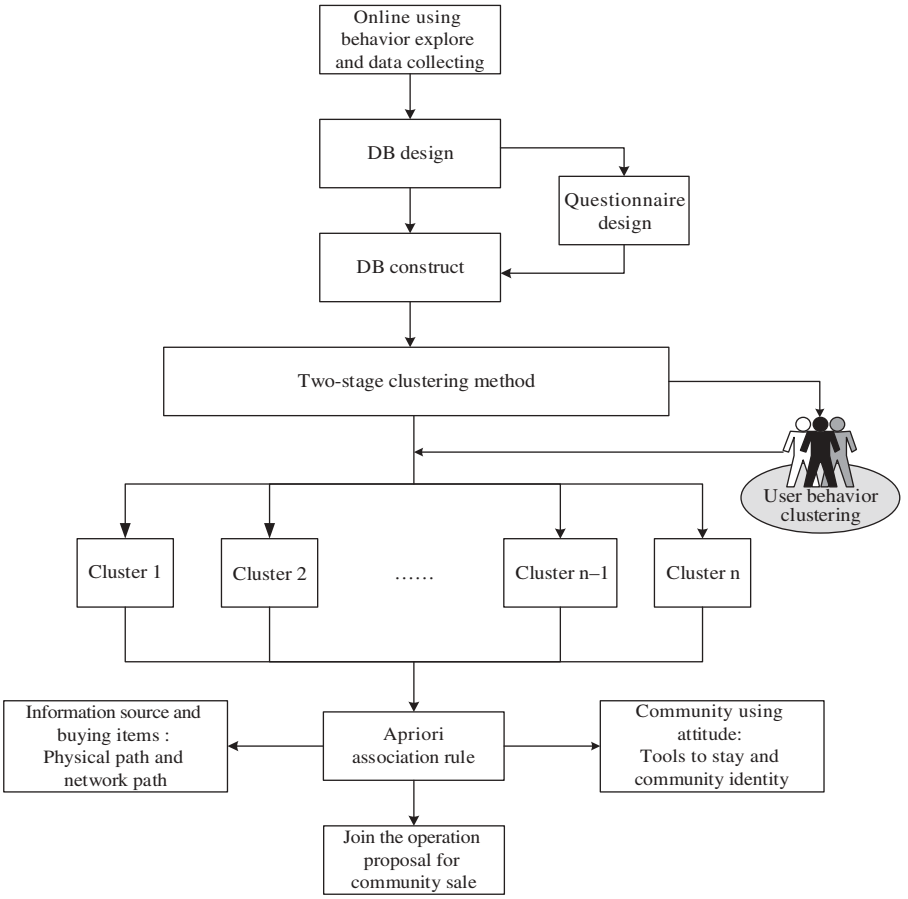


FIGURE 1 Research framework.

data mining procedures to partition users, and association rules analysis yielded three knowledge components: defining the utility aspect of "Tool Value Knowledge Component"; defining the information impact aspect of "Effective Information Medium Knowledge Component"; and defining by the SNS community aspect of "SNS Community Attitude Knowledge Component." These knowledge data components embodied the marketing map that facilitated the strategic concepts in the proposal for the operation of an appropriate social network community marketing campaign.

Database Design

The concept of relational databases was first developed in the 1970s by Codd to represent interrelated data in the form of a table (Codd 1970).

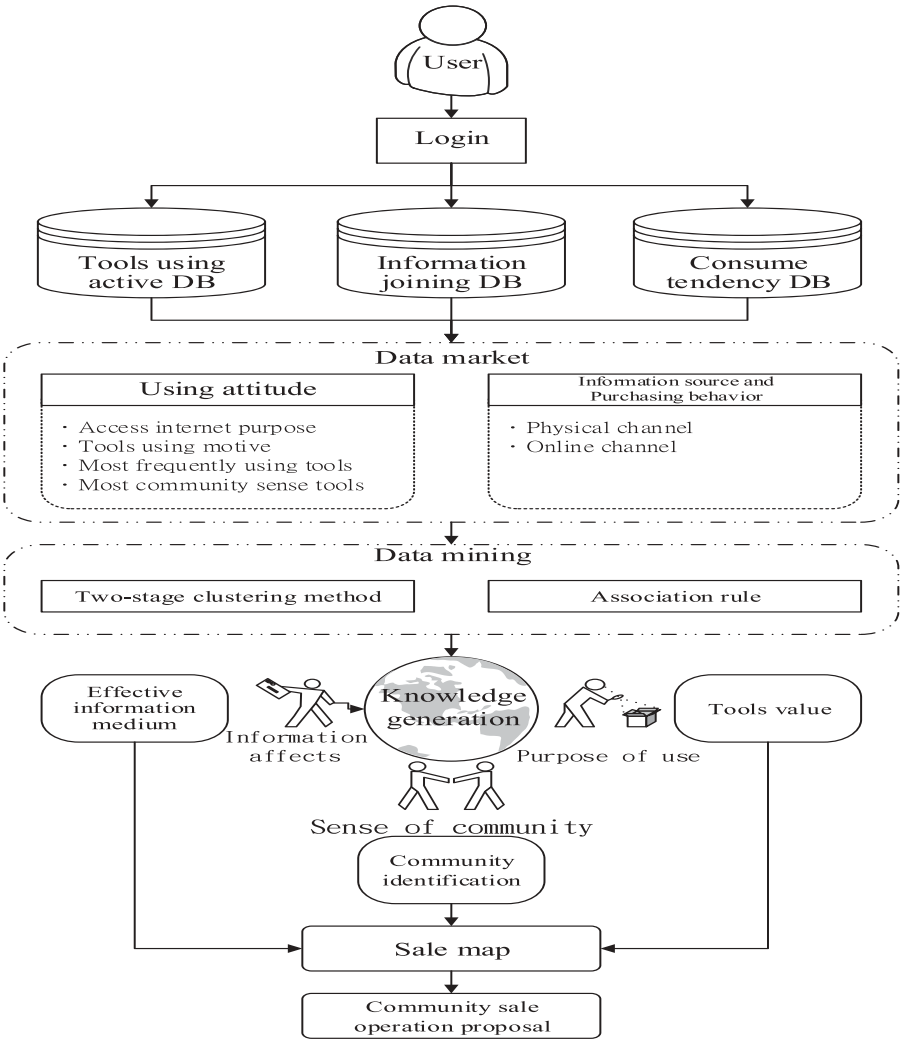


FIGURE 2 System architecture.

It applied the concept of entity in business environments, where the data attributes between entities and their relationships were explored to interpret events that happened and messages that ensued. The term *entity* is used to describe an important object, event, or concept existing within a corporation for its ontological objectivity. Data attributes are used to describe entities' characteristics. Figure 3 is the concept database for this research, which comprises the concept entity database (Entity-Relationship model, E-R model) that was derived from the integration of categorized attributes. The interrelationships among these attributes were explored by

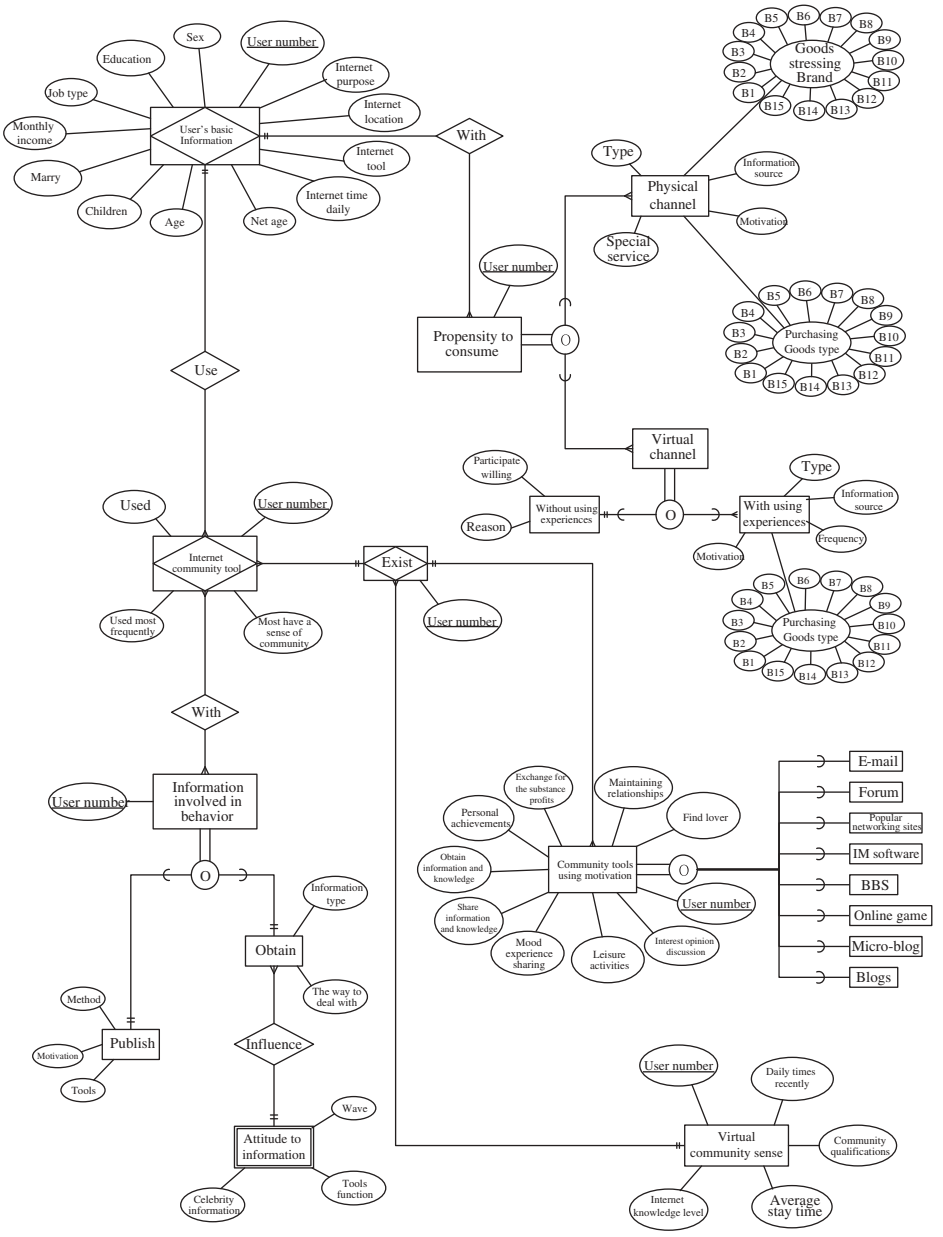


FIGURE 3 Conceptual database (E-R Model).

the formulated questionnaire that gave rise to seven entities, three existing relationships, and 67 attributes. In this study, the relational database contains 15 entities, 4 relationships, and 100 attributes. Figure 3 shows the conceptual databases and their E-R model.

Questionnaire Design and Data Mining Tool—SPSS Modeler

The databases for this research were constructed from results of a survey conducted under randomized sampling. The questionnaires used online distributions that reached relevant social network communities to explore various online behaviors of SNS users. There were six structural components in the questionnaire encompassing basic information of SNS users: participating motive for the SNS community, participating behavior in the SNS community, SNS promotion, online shopping preferences, SNS brand-support fan page, and group tracking. In addition, other issues investigated included sites for online shopping channels, purchased items, information-gathering behavior, and the degrees of acceptance for online channels.

In this research, the **Statistical Package for the Social Sciences** (SPSS) Modeler was employed as the data mining tool for analysis. The difference between SPSS Modeler and other software is that its data processing is through the use of nodes, which are then connected to form a stream frame. In addition, data visualization can be presented to users after the mining process has been completed. The nodes can be divided into six categories: the source node, record options node, field options node, graphs node, modeling node, and output node.

SPSS Modeler provides a different classification of clustering in the modeling node; the data analysis process and the main set of nodes are linked together, to complete the analysis of the data stream processing. Therefore, this study implements the Open Database Connectivity (ODBC) bridge, into Modeler data, in order to establish the analysis process, and employs the SPSS Modeler to analyze data using K-means clustering, followed by application of the Apriori algorithm on each cluster to analyze association rules. These data mining models and processes are summarized in Figure 4.

DATA MINING

Association Rules

Discovering association rules is an important data mining problem (Agrawal, Imilienski, and Swami 1993), and there has been considerable research on using association rules for data mining problems. The association rules algorithm is used mainly to determine the relationships between items or features that occur synchronously in databases. For instance, during a trip to the shopping center, if the people who buy item X buy item Y as well, there exists a relationship between item X and item Y. Such information is useful for decision makers. Therefore, the main purpose for implementing the association rules algorithm is to find synchronous

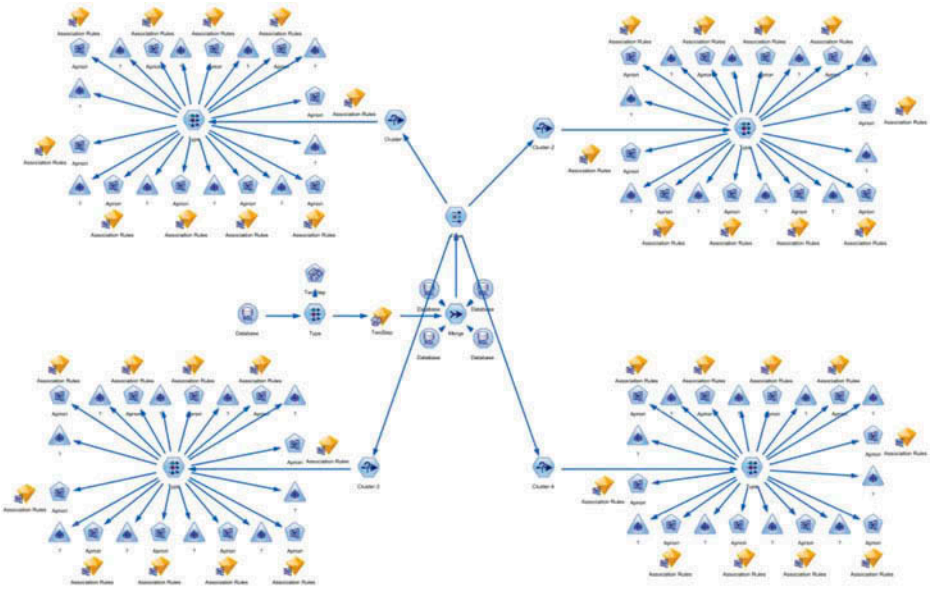


FIGURE 4 Data mining model using SPSS Modeler.

relationships by analyzing random data and to use these relationships as a reference for decision making. The association rules are defined as follows (Wang et al. 2004):

Make $I = \{i_1, i_2, \ldots . i_m\}$ the item set, in which each item represents a specific literal. D stands for a set of transactions in a database in which each transaction T represents an item set such that $T \subseteq I$. That is, each item set T is a nonempty subitem set of I. The *association rules* are an implication of the form $X \rightarrow Y$, where $X \subset I, Y \subset I$ and $X \cap Y = \Phi$. The rule $X \rightarrow Y$ holds in the transaction set D according to two measurement standards—*support* and *confidence*. Support (denoted as_ $\text{Sup}(X, D)$) represents the rate of transactions in D containing the item set X. Support is used to evaluate the statistical importance of D, and the higher its value, the more important the transaction set D is. Therefore, the rule $X \rightarrow Y$ which has support $\text{Sup}(X \cup Y, D)$ represents the rate of transactions in D containing $X \cup Y$. Each rule $X \rightarrow Y$ also has another measuring standard called confidence (denoted as $\text{Conf}(X \rightarrow Y)$), representing the rate of transactions in D that contain both X and Y. That is, $\text{Conf}(X \rightarrow Y) = \text{Sup}(X \cap Y)/\text{Sup}(X, D)$.

In this case, $\text{Conf}(X \rightarrow Y)$ denotes that if a transaction includes X, the chance that this transaction also contains Y is relatively high. The measure of confidence is then used to evaluate the level of confidence about the association rules $X \rightarrow Y$. Given a set of transactions, D, the problem of mining association rules is used to generate all transaction rules that have

certain levels of user-specified minimum support (called Min sup) and confidence (called Minconf) (Kouris, Makris, and Tsakalidis 2005). According to Agrawal and Shafer (1996), the problem of mining association rules can be divided into two steps. The first step is to detect a large item set whose support is greater than Min sup, and the second step is to generate association rules, using the large item set. Such rules must satisfy the following two conditions:

$$\text{Sup}(X \cup Y, D) \geq \text{Min sup}$$

$$\text{Conf}(X \rightarrow Y) \geq \text{Minconf}$$

To explore association rules, many researchers use the Apriori algorithm (Agrawal, Imilienski, and Swami 1993). In order to reduce the possible biases incurred when using these measurement standards, the simplest way to judge the standard is to use the *lift* judgment. Lift is defined as: $\text{Lift} = \text{Confidence}(X \rightarrow Y)/\text{Sup}(Y)$ (Wang et al. 2004).

Clustering Analysis

The process of partitioning a large set of patterns into disjoint and homogeneous clusters is fundamental in knowledge acquisition. It is called *clustering* in most studies and it has been applied in various fields, including data mining, statistical data analysis, compression, and vector quantization. The *k-means* is a very popular algorithm and is one of the best for implementing the clustering process. K-means clustering proceeds in the following order. First, the K numbers of observations are randomly selected from all N number of observations according to the number of clusters, and these become centers of the initial clusters. Second, for each of the remaining N–K observations, the nearest cluster is found in terms of the Euclidean distance with respect to $xi = (xi_1, xi_2, \ldots; xi_p, \ldots, xi_P)$. After each observation is assigned to the nearest cluster, the center of the cluster is recomputed. Finally, after the allocation of all observations, the Euclidean distance between each observation and the cluster's center point is calculated to confirm whether they have been allocated to the nearest cluster. In addition, several studies have discussed implementation of the k-means algorithm for cluster analysis as a data mining approach (Ture et al. 2005).

DATA MINING AND RESULTS

Subject Background

This study ran from January 10, 2012 to March 31, 2013. After deducting repeated respondents, there were 938 returned questionnaires. After

deducting disqualified respondents because of incomplete answers or over-optional selection, there were 910 valid questionnaires. The effective response rate was 97.01%.

Female respondents accounted for 50.55%, very slightly more than males (49.45%). Youths aged 20 to 25 were the largest group, accounting for 47.47%. Most people's education level was university, which accounted for 60.44%, and above postgraduate were 25.6%. The major occupation was that of "Student," which accounted for 49.45%. Those with average monthly income of below NT 5,000 were 39.89% in total. Unmarried people were the majority at 70.55%, whereas 21.98% had fixed partners. Of the married people, most (93.96%) did not have a child.

Most respondents (58.46%) had surfed the Internet for more than nine years. Those who had surfed the Internet for between seven and nine years were the second, and these groups accounted for 80% of the database information in total. Their daily online surfing time was longer than three to five hours; only 17.17% surfed for fewer than three hours. Desktop computers were the most commonly used Internet tools, chosen by 71.1% of the respondents. The main places where they accessed Internet sites were from their homes (90.55%), and schools/offices, at 51.21%. The Internet was being used for recreational activity by 54.84% of the respondents, whereas 47.58% depended on the online world for information.

Clustering Analysis

Importing sample data into Clementine, this study uses the questionnaire data about participation behaviors in online communities as the clusters' variables. Based on Konzinets's (1999) theory on types of members in a virtual community, members of the database are divided into four clusters by the Two-Step cluster algorithm. The data from four clusters is shown in Table 1, in which cluster 1 has 168 pieces of data, cluster 2 has 192, cluster 3 has 286, and cluster 4 has 264.

According to Table 1, this study, based on community interaction and information exchange, divides the data into four clusters, which are, respectively, termed *friendship type, information type, tool type*, and *gossip type*. Community interaction means interaction with friends in online communities. Information exchange indicates the types of information received and the degree of sharing in online communities. The names and definitions of the clusters are shown in Table 2 and presented as follows:

1. Friendship type is active in both community interaction and information exchange.
2. Information type is inactive in community interaction but active in information interactive. That means these members are not active in

TABLE 1 Two-Step Cluster Analysis Data Table

Question \ Cluster	Cluster 1 168 Records	Cluster 2 192 Records	Cluster 3 286 Records	Cluster 4 264 Records
Share information purposes	Friends exchange (95.24%) Work needs (2.38%)	Pure interest (81.77%) Friends exchange (8.85%)	Friends exchange (66.08%) Pure interest (14.69%)	Friends exchange (63.64%) Pure interest (17.42%)
Receiving mode	Seen even (45.24%) Preserved (39.88%)	Preserved (45.83%) Actively express their personal views (39.06%)	Seen even (60.14%) Preserved (34.62%)	Seen even (39.77%) Preserved (37.12%)
Attitude of published by the famous	Just take a look (89.29%) Grandstand (2.38%)	Just take a look (60.42%) Considerable entertainment value (22.92%)	Just take a look (86.01%) Grandstand (5.24%)	Quite valuable (32.95%) Just take a look (29.92%)
Attitude of discussing popular information	Does not exclude, but is not actively involved in (100%)	Does not exclude, but is not actively involved in (67.19%) Very interested in sustained attention (22.92%)	Does not exclude, but is not actively involved in (79.02%) Do not know what is being discussed in the net (12.24%)	Very interested in sustained attention (51.14%) Does not exclude, but is not actively involved in (38.26%)
Attitude of the new tool function	Get to know first (96.43%) Immediately learned the geography of the function (3.57%)	Get to know first (96.43%) Disregarding (96.43%)	Disregarding (85.66%)	Get to know first (60.61%) Disregarding (25.76%)

TABLE 2 Cluster Analysis Named Table

	High Communities Interaction	Low Communities Interaction
High Information Exchange	Cluster 1: friendship type both community interaction and information exchange	Cluster 2: information type not active in maintaining social relationship, targets are not friends but information owners/ information demanders
Low Information Exchange	Cluster 4: gossip type receive information in the mainstream issues, exchange intelligence and discuss with friends through messages	Cluster 3: tool type seek help from family and friends in the online community if they are in need of information

maintaining social relationships. Their targets are not friends but information owners/information demanders.

3. Tool type is inactive in both community interaction and information exchange. These members seldom ask help from unfamiliar people, but they seek help from family and friends in the online community if they are in need of information.
4. Gossip type is active in community interaction but inactive in interactive exchange. These members seldom publish information but only receive information on the mainstream issues. However, they exchange intelligence and discussion with friends, through messages.

Association Rule Analysis: Mining Data Online for Community Behavior

Purposes of Online Surfing and the Most Popular Operating Tool

According to the purpose of online surfing, this section points out what network tools will be used for online retention and application. The most popular operating tool is the consequence, whereas, the purpose of the online surf is the antecedent; as a result, the association rule is induced. The association rules and spider diagrams are shown in Tables 3, 4, 5, and Table 6.

Four clusters, within which the purpose for accessing the Internet and the corresponding tools are different, are found by cluster analysis. The friendship type makes the link to IM software for academic needs, entertainment, and social functions. The information type links with electronic bulletin boards for shopping, work/academic, and information needs. The tool type links with networking sites for academic needs and entertainment: it links with IM software for social functions, academic, and information needs; and it links with electronic bulletin boards for shopping.

TABLE 3 Friendship Type: Purpose of Online Surfing and Operating Tool(s) Used

Rule	Lift	Sup.	Conf.	Consequent	Antecedent
R1a	1.321	17.262	44.828	Most frequently using-MSN, IM software	The purpose of online surf: −Academic needs −Recreational activities
R2a	1.179	14.881	40.000	Most frequently using-MSN, IM software	The purpose of online surf: −Communication needs

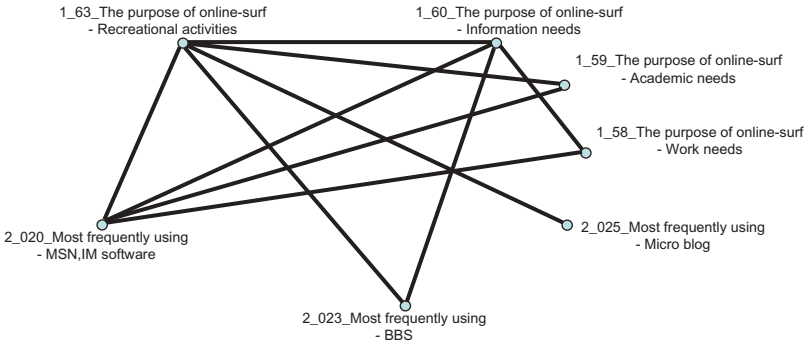


TABLE 4 Information Type: Purpose for Online Surfing and Operating Tool Used

Rule	Lift	Sup.	Conf.	Consequent	Antecedent
R1b	1.783	8.854	52.941	Most frequently using BBS	The purpose of online-surf: −Shopping needs
R2b	1.290	24.479	38.298	Most frequently using BBS	The purpose of online-surf: −Work needs
R3b	1.263	12.500	37.500	Most frequently using BBS	The purpose of online-surf −Work needs −Information needs −Academic needs
R4b	1.189	8.854	35.294	Most frequently using BBS	The purpose of online-surf: −Information needs

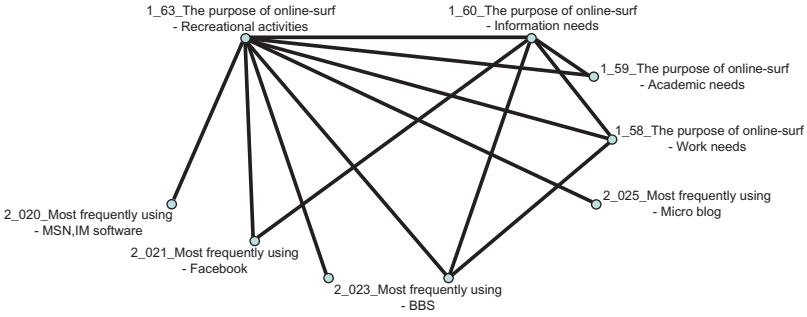
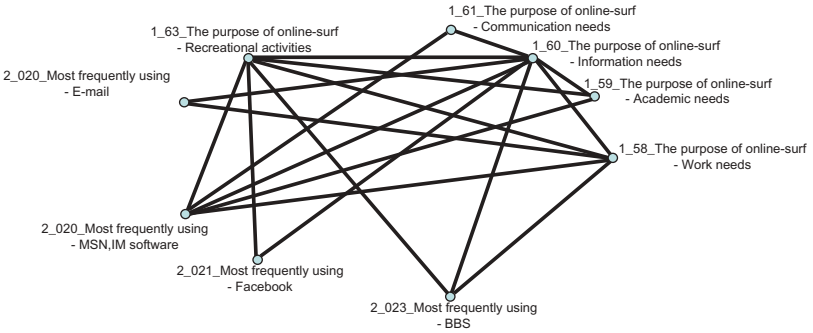


TABLE 5 Tool Type: Purpose of Online Surfing and Operating Tool Used

Rule	Lift	Sup.	Conf.	Consequent	Antecedent
R1d	4.632	7.197	31.579	Most frequently using microblog	The purpose of online surf: −Communication needs −Information needs −Academic needs
R2d	1.431	10.985	37.931	Most frequently using BBS	The purpose of online surf: −Information needs
R3d	1.140	48.864	30.233	Most frequently using BBS	The purpose of online surf: −Information needs
R4d	1.077	8.333	31.818	Most frequently using MSN, IM software	The purpose of online surf: −Shopping needs
R5d	1.015	30.303	30.000	Most frequently using MSN, IM software	The purpose of online surf: −Academic needs



The gossip type links with the microblog for social functions, information, and academic needs; it makes the link with electronic bulletin boards for academic and information needs; and it links with IM software for shopping and academic needs.

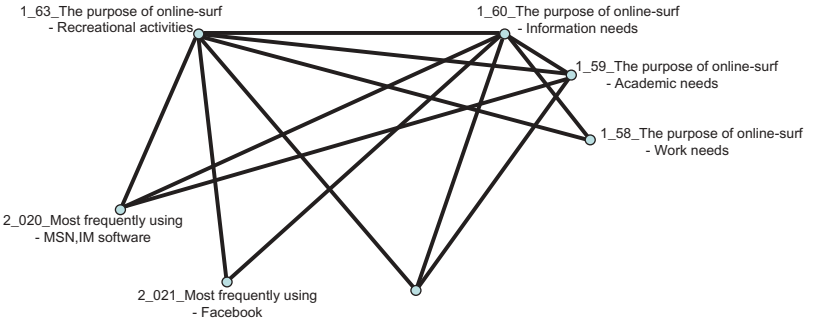
The three clusters other than the information type link with IM software. The friendship type and the tool type use IM software for social functions. The information type link with electronic bulletin boards only to satisfy Internet needs. Except for the aspect of tool type, clusters two, three, and four will go to the Internet for shopping; the information type and the tool type link with electronic bulletin boards for shopping. The gossip type is the only cluster that links with IM software for shopping. Although network linkages of clusters are different, all of them go online for shopping.

Frequently Used Operating Tools and Retention Motivation

This section points out what network tools will be used to satisfy the needs of community participation and motivation. The frequently used operating tool is the consequence, and the retention motivation is the antecedent; as a result, the association rule is induced. The association rule and spider diagram are shown in Tables 7 to 10.

TABLE 6 Gossip Type: Purpose of Online Surfing and Operating Tool Used

Rule	Lift	Sup.	Conf.	Consequent	Antecedent
R1d	4.632	7.197	31.579	Most frequently using microblog	The purpose of online surf: −Communication needs −Information needs −Academic needs
R2d	1.431	10.985	37.931	Most frequently using BBS	The purpose of online surf: −Information needs
R3d	1.140	48.864	30.233	Most frequently using BBS	The purpose of online surf: −Information needs
R4d	1.077	8.333	31.818	Most frequently using MSN, IM software	The purpose of online surf: −Shopping needs
R5d	1.015	30.303	30.000	Most frequently using MSN, IM software	The purpose of online surf: −Academic needs



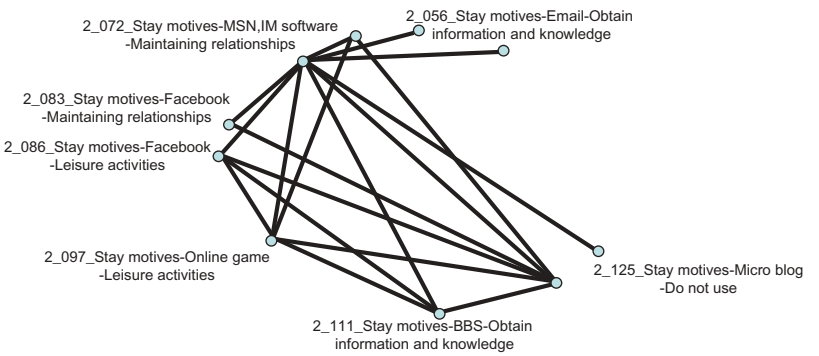
This section verifies the cluster analysis in this study. The degrees of virtual community awareness and retention motivation are different. Relationship maintenance is the main purpose for which the friendship type uses IM software; however, the friendship type also connects with the electronic bulletin board for discussion of interests and for entertainment. Electronic bulletin boards are the network tools most frequently used by the information type for discussing interests and sharing information. Electronic bulletin boards are also the most frequently used network tool by the tool type, though the purposes of this type are for entertainment and information exchange. For the gossip type, IM software and electronic bulletin boards are the most frequently used network tools, because the main purpose for this type is interest discussion. In addition, the association antecedent is mixed with other tools, which means users have a habit of "cross-tooling," using more than one network tool.

Retention Motivation and Sense of Virtual Community

The tool for virtual community awareness is the consequence, and the retention motivation is the antecedent; then, the association rule is induced. The association rules and spider diagrams are shown in Tables 11 to 14.

TABLE 7 Friendship Type: Frequently Used Operating Tools and Retention Motivation

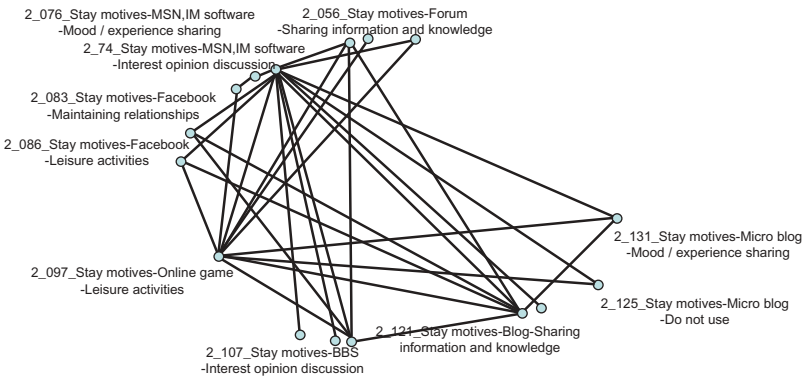
Rule	Lift	Sup.	Conf.	Consequent	Antecedent
R1e	1.801	10.714	61.111	Most frequently using BBS	Stay motives-BBS-Leisure activities
					Stay motives-BBS-Interest opinion discussion
R2e	1.801	10.714	61.111	Most frequently using MSN, IM software	Stay motives-Facebook-Mood/ experience sharing
					Stay motives-Facebook-Maintaining relationships
					Stay motives-Forum-Obtain information and knowledge
R3e	1.801	10.714	61.111	Most frequently using MSN, IM software	Stay motives-Microblog-Maintaining relationships
					Stay motives-Facebook-Maintaining relationships
					Stay motives-Online game-Leisure activities
					Stay motives-MSN, IM software-Maintaining relationships
R4e	1.801	10.714	61.111	Most frequently using MSN, IM software	Stay motives-Facebook-Mood/ experience sharing
					Stay motives-BBS-Obtain information and knowledge
					Stay motives-Facebook-Leisure activities
					Stay motives-MSN, IM software-Maintaining relationships



This section verifies cluster analysis of this study. Although the degrees of virtual community awareness and retention motivation are different, all clusters endorse the community cohesion of networking sites. The main retention motivation is maintaining relationships; that is, no other tool is able to surpass or replace its social function. Relationship maintenance means members interact within an online community, which indicates that it is difficult for members of other communities to be accepted into it. There are different retention motivations for the friendship type and the gossip type, which

TABLE 8 Information Type: Frequently Used Operation Tools and Retention Motivation

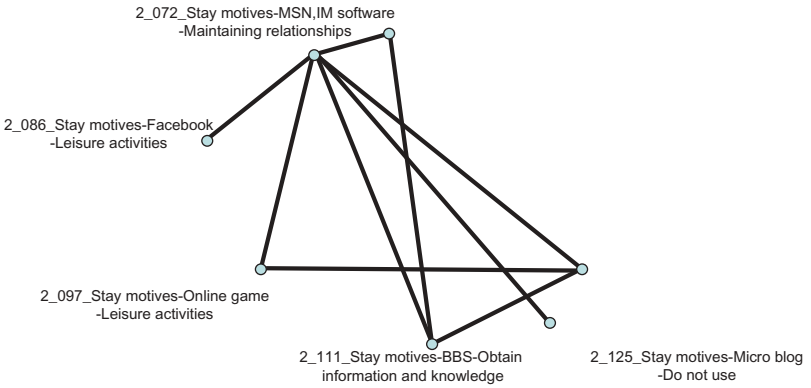
Rule	Lift	Sup.	Conf.	Consequent	Antecedent
R1f	2.144	11.458	63.636	Most frequently using BBS	Stay motives-BBS-Interest opinion discussion Stay motives-Blog-Sharing information and knowledge Stay motives-BBS-Sharing information and knowledge Stay motives-Blog-Mood/experience sharing
R2f	2.105	12.500	62.500	Most frequently using BBS	Stay motives-BBS-Interest opinion discussion Stay motives-Forum-Sharing information and knowledge Stay motives-Blog-Mood/experience sharing
R3f	2.050	11.979	60.870	Most frequently using BBS	Stay motives-BBS-Interest opinion discussion Stay motives-Microblog-Do not use Stay motives-BBS-Sharing information and knowledge
R4f	2.050	11.979	60.870	Most frequently using BBS	Stay motives-Blog-Sharing information and knowledge Stay motives-BBS-Sharing information and knowledge Stay motives-Facebook-Maintaining relationships Stay motives-Blog-Mood/experience sharing Stay motives-MSN, IM software-Maintaining relationships



link only with networking sites. Entertainment is one of the motivations for the friendship type to go on the Internet but not for the gossip type. That means the friendship type will enjoy other functions on the web, but the gossip type sees networking only as a contact tool. Therefore, only the gossip type shows retention motivation on IM software in the association rule.

TABLE 9 Tool Type: Frequently Used Operating Tools and Retention Motivation

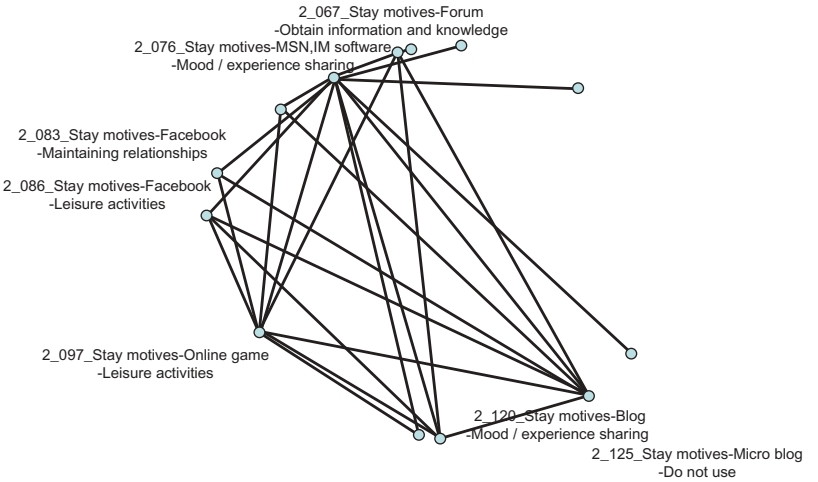
Rule	Lift	Sup.	Conf.	Consequent	Antecedent
R1g	2.145	12.238	60.000	Most frequently using BBS	Stay motives-BBS-Leisure activities Stay motives-Microblog-Do not use
R2g	1.839	12.238	51.429	Most frequently using BBS	Stay motives-Online game-Do not use Stay motives-BBS-Obtain information and knowledge Stay motives-Microblog-Do not use Stay motives-MSN, IM software-Maintaining relationships
R3g	1.836	12.937	51.351	Most frequently using BBS	Stay motives-Facebook-Do not use Stay motives-BBS-Obtain information and knowledge Stay motives-MSN, IM software-Maintaining relationships
R4g	1.788	13.287	50.000	Most frequently using BBS	Stay motives-BBS-Leisure activities Stay motives-BBS-Obtain information and knowledge
R5g	1.788	13.287	50.000	Most frequently using BBS	Stay motives-Blog-Obtain information and knowledge Stay motives-BBS-Obtain information and knowledge Stay motives-Microblog-Do not use Stay motives-MSN, IM software-Maintaining relationships



In the association rule, only the tool type simultaneously uses networking sites and IM software as tools for the online community. Only the tool type and the information type use electronic bulletin boards as a tool for online community, but their purposes are not the same. This is because the information type derives a sense of belonging by information exchange whereas the tool type gets a sense of belonging by contact with others and information exchange. Accordingly, users in clusters have different attitudes (positive or negative) toward information exchange and community interaction.

TABLE 10 Gossip Type: Frequently Used Operating Tools and Retention Motivation

Rule	Lift	Sup.	Conf.	Consequent	Antecedent
R1h	2.137	11.364	56.667	Most frequently using BBS	Stay motives-BBS-Interest opinion discussion Stay motives-Microblog-Do not use Stay motives-BBS-Obtain information and knowledge
R2	1.846	12.500	54.545	Most frequently using MSN, IM software	Stay motives-MSN,IM software-Interest opinion discussion Stay motives-Microblog-Do not use Stay motives-Online game-Leisure activities
R3	1.769	16.667	52.273	Most frequently using MSN, IM software	Stay motives-MSN,IM software-Interest opinion discussion Stay motives-Microblog-Do not use
R4h	1.692	11.364	50.000	Most frequently using MSN, IM software	Stay motives-MSN, IM software-Interest opinion discussion Stay motives-Microblog-Do not use Stay motives-Blog-Mood/experience sharing

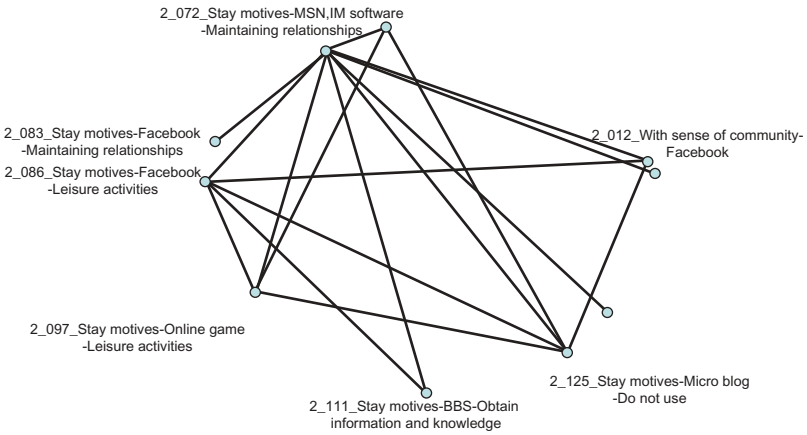


Frequently Used Operating Tools and Virtual Community Awareness

This section considers retention situations and the relationship between network tools and community identification. The tool for the virtual community awareness is the consequence, and the most frequently used operating tool is the antecedent; and the induction of the association rule is derived.

TABLE 11 Friendship Type: Retention Motivation and Sense of Virtual Community

Rule	Lift	Sup.	Conf.	Consequent	Antecedent
R1i	1.531	14.286	87.500	With sense of community Facebook	Stay motives-BBS-Interest opinion discussion Stay motives-Facebook-Maintaining relationships Stay motives-Facebook-Leisure activities Stay motives-Blog-Mood/experience sharing
R2i	1.511	13.095	86.364	With sense of community Facebook	Stay motives-Facebook-Mood/experience sharing Stay motives-E-mail-Maintaining relationships
R3i	1.511	13.095	86.364	With sense of community Facebook	Stay motives-E-mail-Obtain information and knowledge Stay motives-Facebook-Maintaining relationships Stay motives-Online game-Leisure activities

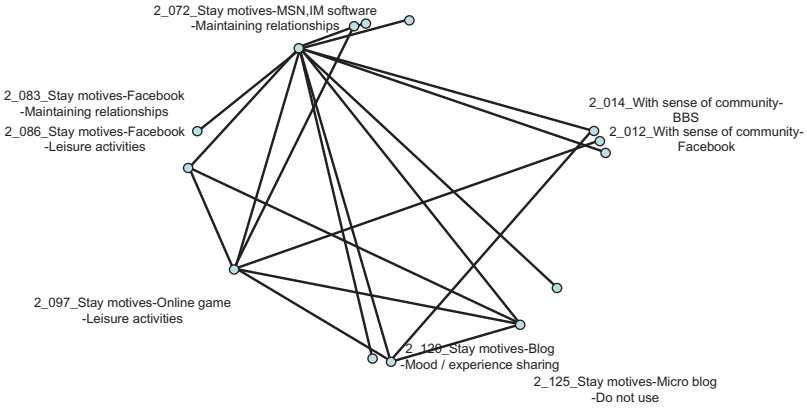


Another association rule is derived by exchanging the antecedent and the consequence for analyzing similarities and differences of attitude on SNS tools using about time and community awareness. The association rule and spider diagram are shown in Table 15.

This section gathers tools that generate virtual community awareness and the frequently used operating tools to explore discussions of the association rule. The frequently used operating tool is consistent with its Internet purposes of retention motivation and virtual community awareness. No matter what purpose, motivation, and method are used, the tools are similar. Such tools will let users have virtual community awareness, which is presented in the association rule.

TABLE 12 Information Type: Retention Motivation and Sense of Virtual Community

Rule	Lift	Sup.	Conf.	Consequent	Antecedent
R1j	1.605	48.958	70.213	With sense of community Facebook	Stay motives-Facebook-Maintaining relationships Stay motives-Facebook-Exchange actual benefits
R2j	1.373	46.354	70.787	With sense of community BBS	Stay motives-BBS-Sharing information and knowledge



In addition to the electronic bulletin boards and IM software frequently presented in the association rule, three clusters obtain virtual community awareness from the microblogs, which are considered as the most frequently used network tools. This is important because microblogs seldom appear in other studies. Users who derived virtual community awareness from the microblogs will frequently connect with them, and even friends spread information obtained from the microblogs. This business strategy is not limited to the use of the microblogs, and other network tools presented in the association rule have such commercial potential.

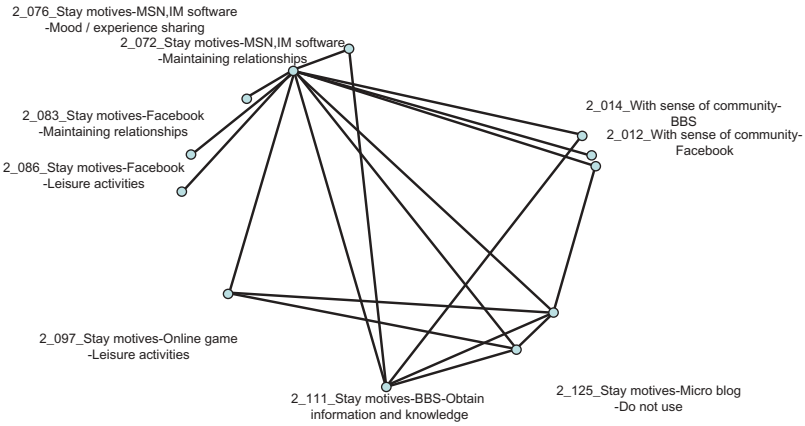
The association rule reveals that the frequently used operating tools and the virtual community awareness are interrelated, which is especially clear in networking sites. This means that if users do not frequently use such tools, it is not easy to acquire virtual community awareness, and vice versa. Therefore, if an enterprise wants to run an online community effectively, the tool should be attractive to entice users and increase usage rate.

Reference and Behaviors of Purchasing

The relationship between the online activities of members in four clusters and the shopping behaviors are known. This section sets the preference for physical shopping channels and past online shopping as the

TABLE 13 Tool Type: Retention Motivation and Sense of Virtual Community

Rule	Lift	Sup.	Conf.	Consequent	Antecedent
R1k	1.826	16.084	80.435	With sense of community BBS	Stay motives-Online game-Do not use Stay motives-BBS-Obtain information and knowledge
R2k	1.728	17.133	75.510	With sense of community Facebook	Stay motives-BBS-Interest opinion discussion Stay motives-Facebook-Maintaining relationships
R3k	1.728	17.133	75.510	With sense of community Facebook	Stay motives-Forum-Interest opinion discussion Stay motives-Facebook-Maintaining relationships
R4k	1.469	19.580	75.000	With sense of community MSN, IM software	Stay motives-BBS-Do not use Stay motives-MSN, IM software-Maintaining relationships



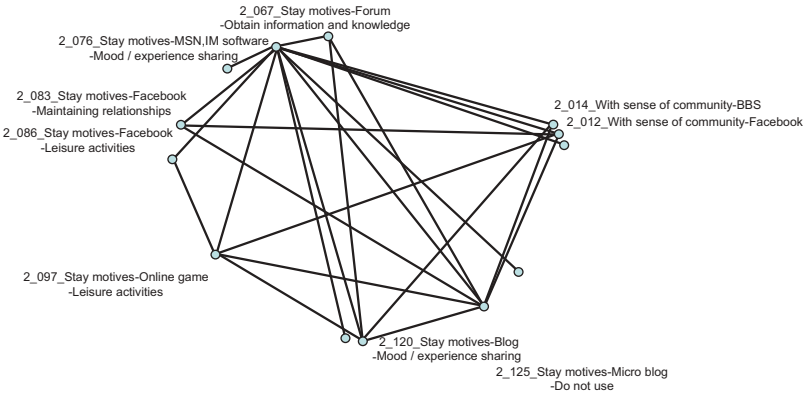
consequence, and the source of shopping information is the antecedent. Then, inducing the association rule, the relationships between the source of shopping information and the shopping behaviors in physical/online channels are found. In addition, exchanging the consequence and the antecedent, this study finds the source of shopping information that members in four clusters use if they shop through these two shopping channels. The association rules and spider diagrams are shown in Table 16.

The items of online shopping and the influence of information sources in the four clusters are similar. This means that there is almost no difference in the four clusters' online shopping behaviors and information sources. The items shown in this study are goods usually bought online by the major online community users. Therefore, the information sources for these items are the most appropriate places for advertising.

From the association rules of behaviors on shopping and the information gained through physical and online channels, both the friendship type and

TABLE 14 Gossip Type: Retention Motivation and Sense of Virtual Community

Rule	Lift	Sup.	Conf.	Consequent	Antecedent
R1l	1.348	27.273	79.167	With sense of community Facebook	Stay motives-Facebook-Mood/experience sharing Stay motives-Facebook-Maintaining relationships
R2l	1.307	32.576	76.744	With sense of community Facebook	Stay motives-Facebook-Mood/experience sharing Stay motives-MSN, IM software-Maintaining relationships
R3l	1.294	28.409	76.000	With sense of community Facebook	Stay motives-Facebook-Maintaining relationships Stay motives-Forum-Obtain information and knowledge Stay motives-MSN, IM software-Maintaining relationships
R4l	1.277	28.788	75.000	With sense of community Facebook	Stay motives-Facebook-Mood/experience sharing Stay motives-Blog-Mood/experience sharing Stay motives-MSN, IM software-Maintaining relationships



the gossip type are interested in fashionable clothing or accessories. Their shopping intention is not fixed by channels. Even the information-gained channel is the same in both groups because the items that they buy from physical channels and from online channels are totally different. Therefore, this study shows that the shopping intention and shopping channel are not fixed by the information-gained channel.

The association rule of the influence of the information channel on shopping intention shows that users search for information about online shopping from many websites, not only from the online community. Because the main retention motivation of the online community is not to collect

TABLE 15 Frequently Used Operating Tools and Virtual Community Awareness

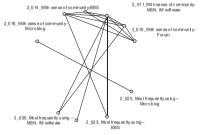
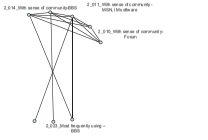
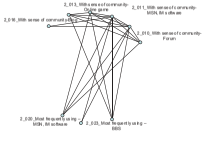
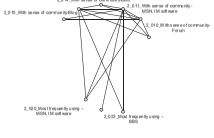
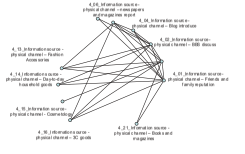
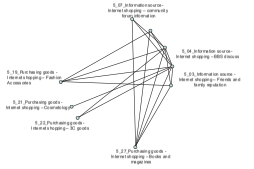
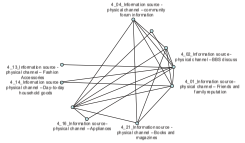
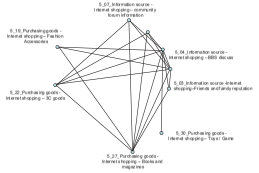
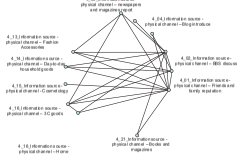
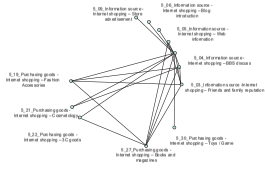
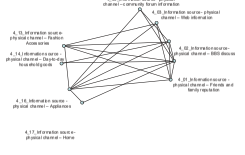
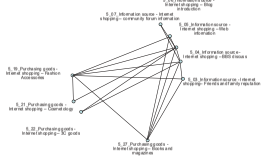
	Lift	Sup.	Conf.	Consequent	Antecedent
Cluster 1 (Friendship Type)	Microblog	No	Microblog	No	
	BBS	No	BBS	Internet forum	
	IM software	No	IM software	BBS	
	Popular networking sites	IM software		Popular networking sites	
Cluster 2 (Information Type)	Microblog	No	Microblog	Online game	
	Online game	No	Popular networking sites	Blog system	
	BBS	No		Blog system	
	Popular networking sites		BBS	IM software	
	IM software	No			
Cluster 3 (Tool Type)	Popular networking sites	No	IM software	Blog system	
		No	BBS	IM software	
	BBS	Popular networking sites		Internet forum	
	IM software			Online game	
Cluster 4 (Gossip Type)	BBS	No	Micro-blog	IM software	
				Internet forum	
				Online game	
	Popular networking sites	No	BBS	Internet forum	
	IM software	No	IM software	Blog system	
				Popular networking sites	

TABLE 16 Reference and Behaviors of Purchasing

	Physical Channel			Online Channel		
	Information ↓ Purchasing	Purchasing ↓ Information	Spider Map	Information ↓ Purchasing	Purchasing ↓ Information	Spider Map
Cluster 1 (Friendship Type)	Reputation (clothes) Forum (home use, clothes, 3C) BBS (clothes, 3C) Web (clothes, 3C) Report (home use) Advertising (clothes) Clerk (3C)	Reputation (appliances, cosmetology, food) BBS (cosmetology, food) Web (appliances, 3C)		Reputation (books, clothes) Forum (books) BBS (clothes, books) Web (clothes) blog (books) Advertising (clothes)	BBS (cosmetology, clothes) Web (toys, 3C, books)	
Cluster 2 (Information Type)	BBS (3C) Blog (3C) Web (3C) Advertising (3C)	BBS(clothes, food, appliances, 3C, home use)		BBS (books) Blog (books) Web (books) Forum (books)	BBS (cosmetology, clothes) Web (video, toys, books)	
Cluster 3 (Tool Type)	BBS(3C) Web (home use, 3C) Forum (home use) Reputation (home use, 3C)	BBS (3C, food) Reputation (cosmetology, food, clothes, books)		BBS (clothes) Web (books) Blog (books, clothes) Reputation (clothes) Report (books)	Web (toys, books, 3C, cosmetology)	
Cluster 4 (Gossip Type)	BBS (clothes, 3C) Blog(clothes) Forum (3C) Advertising (clothes)	BBS (daily, food)		BBS (books, clothes) Blog(clothes) Forum (books) Reputation (clothes)	BBS (clothes) Web (3C, books, cosmetology)	

product information, users do not expect to obtain such information to meet shopping needs. The inference is shown as follows:

1. After obtaining merchandise information through the online community tools, which have community cohesion and give users a sense of belonging, users still choose physical shopping channels instead of the online channels. In this association rule, the weak influence of the online community tools' information is shown.
2. After obtaining merchandise information through the online community tools, which have community cohesion and give users a sense of belonging, users might not buy the products immediately. They might ask for more information from other places (for example, advertising or other websites) for purchasing the products. So, they do not think that the information is gained from the online community tools.

The association rule of the shopping and information gained shows that Internet forums, electronic bulletin boards, and blog systems are more influential and valuable than the traditional online community tools. However, there is no association rule between shopping behaviors or source of information and popular networking sites or microblog. The following inference is shown:

1. The online community tools, which have community cohesion and give users a sense of belonging, focus on interpersonal communication, so their performance for commodity information delivery is inefficient.
2. The online community tools, which have community cohesion and give users a sense of belonging, have potential for the delivery information function on commodities, but there is room for improvement.

This study verifies the transmitting function and the influence of online community tools. For example, the blog system, electronic bulletin boards, or forums websites. However, the deciding power is in the users' hands. What tools can do to improve transmitting is to create different marketing models in order to attract different groups.

MANAGERIAL IMPLICATIONS

Based on "Frequently Used Operating Tools and Virtual Community Awareness" in the previous section of the analysis, the marketing knowledge map of users' behaviors in each cluster is drawn. For example, in Figure 5, open circles show tools that are the frequently used operating tools, that let users stay on them, and that give users virtual community awareness. Solid

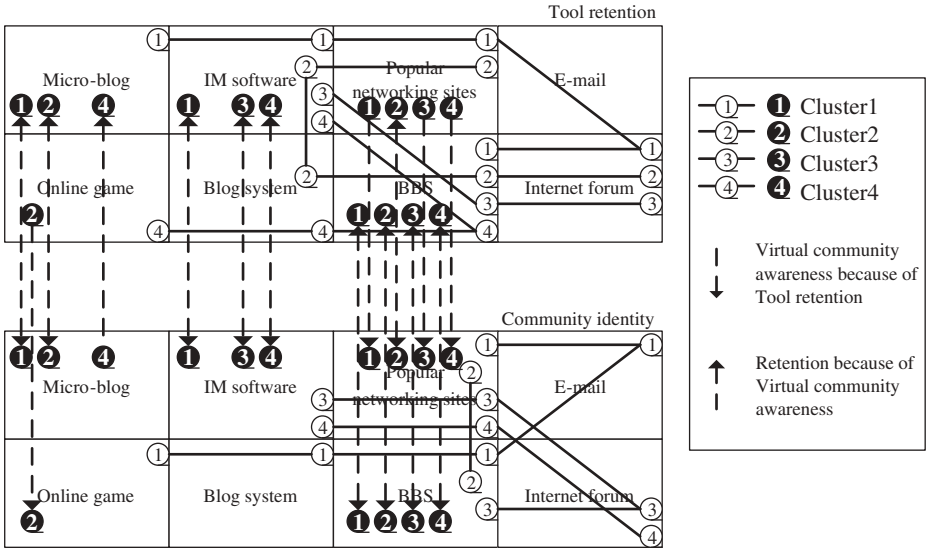


FIGURE 5 Marketing knowledge map: tool retention and the community identity.

circles represent the affected clusters, which are influenced by both retention period and the virtual community awareness, and arrows represent the direction of the impact. Based on the marketing map, this study proposes managerial implications as follows.

Information Role of Members and Value of Application Tool

Because of the different information roles in each cluster, although users may have the same motivation or purpose, they choose different tools and application methods. For a certain cluster, only cross-functional tools used frequently offer users a sense of belonging in the communities, through in some situations a single tool does that application. Table 17 shows the information of each cluster's information role, favorite tools, and degree of community awareness. Table 18 shows enterprises' strategies for the community tools.

SNS Community Identification of Tools

Virtual community awareness is created when users use some of the online community tools. This means that the online community cohesion is strengthened when users are more dependent on the tools. Thus, if enterprises want to promote products in the online communities, the tools in communities should be attractive and interactive in order to attract users'

TABLE 17 Information Role of Members and Value of Application Tool

Cluster	Informational Role	Attribute	Type	Value in Use
Cluster 1 (Friendship Type)	Message dispersal	Most commonly used	Electronic bulletin boards	Share Memory/acquire knowledge
			IM software	To share information as interpersonal sustaining practices As interpersonal sustaining to maintain relations tool use To pass the time and use tools
		Sense of virtual community	Networking sites	Information exchange online community settlements
Cluster 2 (Information Type)	Message creator	Most commonly used	Electronic bulletin boards	To share information experience and the use of tools
		Sense of virtual community	Electronic bulletin boards	Share/acquire knowledge
			Networking sites	Leisure activities and Maintaining relationships
Cluster 3 (Tool Type)	Message demanders	Most commonly used	Electronic bulletin boards	Obtained information and Maintaining relationships
		Sense of virtual community	Electronic bulletin boards	Share/acquire knowledge
			Networking sites	Due to the sharing of interests, opinions exchange to generate online community settlement
			IM software	Maintaining relationships and mood experience sharing
Cluster 4 (Gossip Type)	Message dispersal	Most commonly used	Electronic bulletin boards	Share/acquire knowledge
			IM software	Exchange of game experience and the use of tools exchange of mood experience and the use of tools
		Sense of virtual community	Networking sites	Spreading knowledge bring online community settlements By mood share bring online community settlements

attention and to communicate with them. For example, information in the online communities should be updated regularly to remain current and should be interactive to keep users' attention.

TABLE 18 Business Strategies on the Community Tools

Cluster	Manufacturers Can Participate in the Network Tools	Propaganda Content	Manufacturers' Mix of Community Tools Strategy
Cluster 1 (Friendship Type)	Internet forums	Writers published experience article	Establish networking sites Microblogs as one of the community system
	Networking sites microblogs	Activities flyers	
	IM software	Interactive communication	
	Electronic bulletin boards	Introduction text	
Cluster 2 (Information Type)	Electronic bulletin boards	Writers published experience article	Community links not cross-tools
	Internet forums		
	Blog system		
Cluster 3 (Tool Type)	Electronic bulletin boards	1. Please Writers published product comparison article	Use Electronic bulletin boards/Internet forumsas information carrier, link networking sites
	Internet forums	2. Lead participants article discusses the increased content richness	
Cluster 4 (Gossip Type)	Online games	Placement marketing	1. Use IM software as an intermediary , link networking sites and others information sources.
	Blog system	Writers published experience article	2. Use microblogs as an information carrier, link to networking sites and expand to IM software community

Furthermore, users frequently use online community tools because of the association rule of virtual community awareness; users repeatedly use an online community tool and communicate with other members if they have virtual community awareness. If enterprises want to promote products in online communities, they should encourage users to have a sense of belonging to the communities. For example, privileges such as regular sales activities, merchandise discounts, public relations gifts, discussions, and experience sharing, honor the users and strengthen their sense of belonging. Table 19 shows tools that create the virtual community awareness in each cluster and tools that are used by enterprises' marketing in online communities.

TABLE 19 The Most Frequently Used Online Community Tools and Enterprises' Operating Proposals

Tools	Using Frequently in the Communities the Virtual Community Awareness Is Created	Countermeasure The Members Can Stay in Their Own Community Created	The Virtual Community Awareness Is Created Using Frequently in the Communities	Countermeasure the Members Can Stay in Their Own Community Created the Virtual Community Awareness Is Created
IM software	Cluster 1 and Cluster 4	Contact human communication and interaction game to information release and event marketing results	Cluster 1	Use IM software Communication program release message streaming game increase users' stay in IM software Hours and when the number of use
Networking sites	Cluster 1 to Cluster 4 (all)	With varying degrees of interactive activities held in the tool	Cluster 4	Positive interaction with the participants in the activities
Electronic bulletin boards	Cluster 1 to Cluster 4 (all)	To enhance the speed and quality article updates the content will have to prescribe the right medicine	Cluster 1 to Cluster 4 (all)	Increase real-time interactive services and the cluster two members solicit published activities
Microblogs	Cluster 1 and Cluster 3	To allow users to create a user personality would like to subscribe	Cluster 4	Through timeliness activities enhance community cohesion
Online games	Cluster 2	Event marketing can be cross-industry alliance to create the game makers	None	

Information Influence and Media Use

From integrated analysis of Table 16, this study draws marketing knowledge maps of information sources and product items, such as Figures 6 and 7, to show the information channel that each cluster obtained. Hollow circles

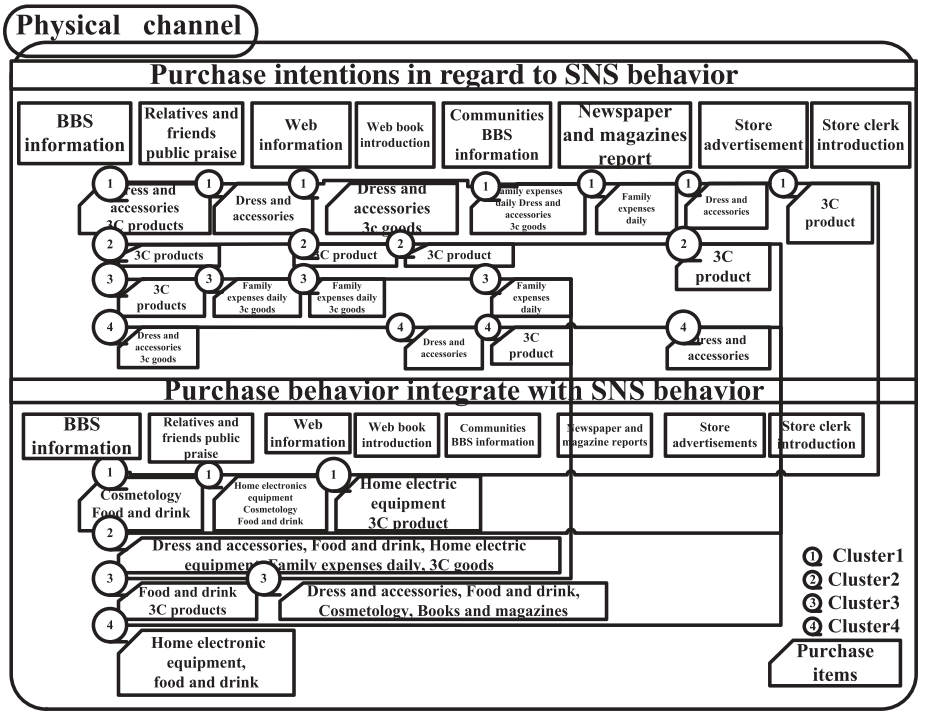


FIGURE 6 Marketing knowledge maps of information sources and product items (for physical channels).

represent the way that each cluster attains the product information. Product items provided in this way are shown in the box. From the marketing map (Figure 7), this study provides recommendations for marketing in online communities to enterprises in both physical and online channels.

1. For enterprises in the physical channel, employing information only on available online channels is not sufficient for marketing operations in online communities. These firms should attract users to become members and encourage their feedback to support marketing in the online communities. Although users tend to buy products from the physical channels and collect related information on the Internet, enterprises should spread information actively to attract users.
2. For enterprises in the online channel, the online image is critical for users, and accurate product and channel information is vital for each cluster's members. Therefore, enterprises should first present a full product introduction on the website, and then develop their own online community. In other words, enterprises should set business activities as the basis for accumulating trading experience in order to concretely build their own online community.

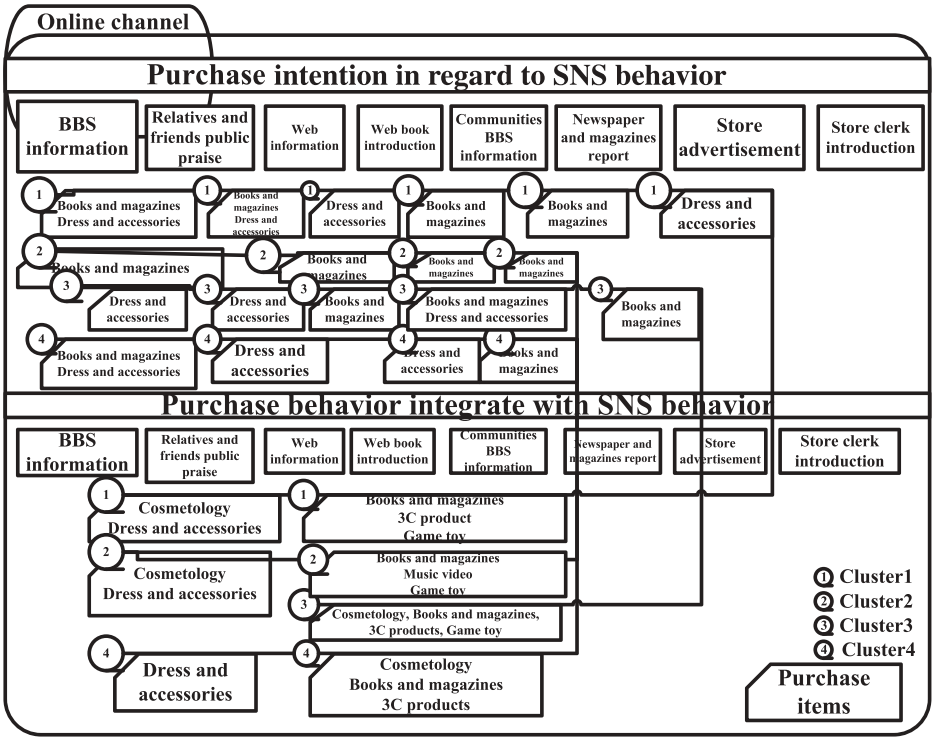


FIGURE 7 Marketing knowledge maps of information sources and product items (for online channels).

CONCLUSION

SNS communities are not only a single location, space or tool, but a network or society formed by links or relationships among online communities' members. This study verifies that members from each cluster use not only online community tools but also cross-use tools. This means that a community is run not only by a single tool or in a single location but possibly through friends in other online communities. Cross-tool or cross-community use is the most valuable characteristic of online communities and why there are no barriers on the Internet.

The friendship type, the information type, the tool type, and the gossip type are four clusters that were divided by clustering analysis. These four clusters represent four behaviors and attitudes, which are friendship cohesion, external exchange, tools using, and information exchange. Because the research target is online communities' users, the difficulty in products' promotion of enterprises is unpredictable. These four clusters spread information accurately by dividing the work of creating, spreading, and operating information.

However, the sources of information might not be online communities, so if enterprises want to set online communities as the business model, there should be a detailed blueprint to build their brand image and strengthen customer loyalty. Direct sales results and online communities' tools are not online community marketing. Therefore, the number of participants and times of login cannot be the standard to evaluate the efficiency of the online community marketing. Instead, the quantity and quality of discussion and the type and characteristics of information spread in the communities should be the criteria.

The marketing map shows that in addition to electronic bulletin boards, the sources for information on products are websites, relatives, and friends, and this reaffirms that more trusted information comes from people users are close to. Online communities are just platforms for users to have discussions, chat, and sharing. Therefore, when enterprises start online community marketing, they should have a professional website structure and accurate product information to gain users' credibility and further give them a sense of belonging in the community.

Finally, the advantage of building an online community is not only to increase sales, but also for brand image, customer loyalty, and constant public marketing. The most significant advantage is for direct and all-round business management, so that if negative responses to the enterprise appear, the damage is reduced to a minimum. Because the Internet is used by many people, businesses must check their product and service quality for positive advertising effect in the online community marketing.

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