

Evaluating customer values by word-of-mouth: an empirical study of a telecommunication network

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Word-of-mouth (WOM) is an important way for companies to gain new customers and new value, therefore the indirect value a customer brings to the company through WOM should not be ignored. The empirical analysis on the data of a wireless service provider shows that customers' WOM value is very comparable to their direct values. In addition, the WOM value is positively related to the customers' social capital and has an inverted U-shape link to the proportion of weak ties within the customers' social network. These findings extend the previous understanding on customer value from direct value to indirect value of WOM, and provide some insights on the antecedents of WOM value.

KEYWORDS AND PHRASES: Customer value, Word of mouth, Social network.

1. INTRODUCTION

Customer networks are widely accepted as intangible but valuable assets for a firm. As a result, acquiring and retaining customers who are critical to the network and valuable to the firm has become an important task for customer relationship management. However, acquiring and retaining customers incur cost [1]. Therefore it is necessary to allocate a firm's scarce resources to those valuable customers. Consequently, how to correctly identify valuable customers becomes a critical problem.

A customer's value or profitability can be defined as the present value of the future profit stream expected over a given time horizon of transacting with the customers [2]. Such a definition enables practitioners to differentiate profitable customers from non-profitable ones according to their long-term profitability. Subsequently, various managerial problems can be solved in a principled manner. Despite its popularity, this definition suffers from several serious limitations. More specifically, during the "transacting," a customer is typically required to purchase either a product or service from the firm. For convenience, the value generated by such a direct "transacting" process is referred to as direct value. While focusing only on direct value, the traditional definition ignores a customer's indirect value, which might even be more significant than the direct value, taking into account a customer's various network resources. For

example, a customer with low direct value may contribute appreciable profits to the firm by introducing many other valuable customers, i.e., word-of-mouth (WOM). WOM is a special social network to tie all the customers together.

As noted by Godes and Mayzlin (2004), "there is little debate as to whether WOM matters to the firm [3]." In particular, Katz and Lazarsfeld (1955) find that, depending on the household items, WOM might be the most important source of information [4]. The seminal work of Bass (1977) further reveals that WOM plays a critical role for new product diffusion [5]. However, the effect of WOM might also be negative, particularly if the consumer is not satisfied [6]. The effect of WOM and product-attributed information on persuasion has been investigated by Herr, Kardes, and Kim (1991) under a controlled experimental environment [7]. Cross-cultural comparison of the WOM referral behavior has been performed by Money, Gilly, and Graham (1998) based on samples from the United States and Japan [8]. To gauge WOM communication practically, some WOM measures have been developed by Godes and Mayzlin (2004) based on online conversations [3]. A study of Villanueva, Yoo and Hanssens (2008) further demonstrates that, compared to other customers, customers persuaded by WOM are more valuable in terms of long-term profitability [1]. There is also other evidence regarding WOM's financial contributions to a company [9, 10, 11]. Researchers further concluded that the profitability of WOM results from the market expansion and customer acceleration of adoption [12, 13, 14].

The above-mentioned studies suggest that WOM has great value to a firm and is an important component of a customer's overall value. As a result, a customer's WOM value should be carefully investigated, rather than ignored, which has motivated the study of a customer's value from the perspective of WOM. Arguably, this is a problem with profound importance to both theory and practice. Theoretically, this research extends the current understanding of customer value from direct value to WOM value. As a result, a strong linkage between customer value and WOM can be constructed. This may further inspire fruitful research about customer value and WOM. This research is also important in practice because it provides another useful and complementary measure in addition to direct customer value. As a result, traditional value-based customer relationship management can be practiced in a more flexible way.

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Despite the importance of WOM for customer valuation, little relevant research has been done, according to the researcher's best knowledge. This situation is not surprising because empirically investigating a customer's WOM value is extremely difficult. To accurately capture a customer's WOM value, one needs to have (1) a complete record of a customer's referral behavior, and (2) a complete measure of the customer's WOM value. However, such requirements are both rather stringent. Most customer referral behaviors are not observed by the firm and therefore cannot be recorded. Meanwhile, even if a customer's referral behavior is accurately captured, the amount of value created by such a referral is usually not clear.

By making use of a very unique and valuable dataset provided by a major mobile service provider in China, this issue can be more accurately investigated. An appreciable portion of this mobile service provider's customers are college students. To enhance their loyalty, the firm launched a College Student Network (CSN) plan. The members in the CSN enjoy a much lower price for all the phone calls made within the network. In addition, the existing members are encouraged to send text messages to their close friends to join the CSN, as long as their friends are existing customers of the firm. Obviously, an existing CSN member might contribute to the firm in two different ways. Primarily, he/she can contribute to the firm's revenue by subscribing and purchasing the firm's mobile phone services. This is the value due to direct consumption. Secondly, an existing CSN member might also contribute to the firm by soliciting other valuable customers to join the network. All of these values are produced by the WOM. Since only existing customers are allowed to be invited, the revenue generated by a customer before and after joining the CSN are accurately recorded by the firm's information system. Obviously, the revenue difference is a customer's value change due to CSN referral and can be used as a measure for WOM value. In addition, such a WOM value measure is related to a set of explanatory variables which capture the customer's social network characteristics, such as social capital and social ties. Based on the theory of customer value, WOM and social network, we develop two hypotheses on how a customer's social network can influence their WOM value. Using the data from the wireless service provider, we further empirically demonstrate the hypotheses.

2. THEORY

This research is closely related to the literature of customer value, word of mouth, and social network. In this section, we reviewed the relative literature of these three topics to develop our research hypotheses.

2.1 Customer value

Customers are important intangible assets of a firm that should be valued and managed [15]. Based on the evaluation

of customer value, firms can allocate their scarce marketing resources to maximize the customer value [16, 17].

Traditionally, the value of customers comes from their profitability. An existing research stream on customer profitability focuses on the net profit that customers contribute to a firm [2, 17]. Another similar concept in the literature is customer lifetime value (CLV), which emphasizes the customers' long-term profitability [18, 19]. Some other authors have also tapped this issue using the term customer equity on the aggregate level [20, 21]. For the aggregate analysis, a critical problem is identifying the active customers who are regarded as main profit source for a company. However, previous studies on customer profitability, customer lifetime value, or customer equity are mostly focused on the direct value derived through customer purchase.

Several researchers recognize the indirect value of customers. With the rapid growth of the internet industry, the value of customers does not necessarily come from the profit they contribute to the firm. Trueman, Wong and Zhang (2000) have revealed that bottom-line net income has no relationship with the stock price of internet firms; however, unique visitors and page views show otherwise [22]. Demers and Lev (2001) also find that nonfinancial measures, such as reach (i.e., number of unique visitors) and stickiness (i.e. the site's ability to hold its customers) explain the share price of internet companies [23]. The same conclusion has been demonstrated by Gupta, Lehmann and Stuart (2004): the financial value of a firm, including high-growth firms with negative earnings, is significantly affected by its customers [24]. Although these studies considered the indirect value of customers, there are still some important issues remained to be discussed, such as the source of the indirect value, how the indirect customer value on individual level is evaluated, and what factors influence the indirect customer value. The present study focuses on the indirect customer value that comes from WOM.

2.2 Word of mouth

WOM communication has received increasing attention because it combines the prospect of overcoming consumer resistance with significantly lower costs and fast delivery [25]. Earlier research on the effectiveness of WOM has mostly focused on new product or innovation adoption [5, 26, 27]. Herr, Kardes and Kim (1991) find that face-to-face WOM communication is more persuasive than print communication [7]. Researchers have also examined the conditions under which consumers are likely to rely on the opinions of others to make a purchase decision and the motivations for different people to spread the comments about a product. Cowley and Rossiter (2002) show that WOM has the greatest effect when consumers who are more uncertain about their initial attribute judgments are exposed to WOM that disconfirms their estimates [28]. Anderson (1998) proposes a utility-based model that gives rise to a U-shaped function: very dissatisfied customers and very satisfied customers are most likely to engage in WOM [29].

In another research stream, typical WOM communication—referral behavior is examined. According to Brown and Reingen (1987), at the macro level, weak ties display an important bridging function that allows information to travel from one distinct subgroup of referral actors to another subgroup in the broader social system [30]. In contrast, at the micro level, strong and homophilous ties are more likely to be activated for the flow of referral information. Strong ties are also perceived as more influential than weak ties, and these are more likely to be utilized as sources of information for related goods. Money, Gilly, and Graham (1998) examine the effects of national culture to referral behavior for industrial services such as advertising, banking, and accounting [8]. The results show that national culture has a strong effect on the number of referral sources consulted, and that Japanese companies use more referrals than comparable American companies.

The value of referrals has also been studied. Trusov, Bucklin and Pauwels (2009) study the effect of word-of-mouth marketing on member growth at an internet social networking site and compare it with traditional marketing vehicles [25]. WOM referrals have substantially longer carry-over effects than traditional marketing actions on the number of new members subsequently joining the site (sign-ups), producing substantially higher response elasticity. Based on the revenue from advertising impressions served to a new member, the monetary value of a WOM referral can be calculated. Moreover, Villanueva, Yoo and Hanssens (2008) suggest that customers who self-report being acquired through WOM add more long-term value to the firm than customers acquired through traditional marketing channels [1]. However, the researchers measure the value of WOM on the aggregate level, not on the individual level. The values of WOM referrals made by different customers, especially by customers in different social networks, are potentially different. A customer's social network is proposed as an important influential factor on the indirect value of customers due to WOM.

2.3 Social network

Research in social networks could help in further solving the question of the source of customer's indirect values. The value created from WOM is not limited to dyadic influence because it can be extended to a broader social network. White (1981, 2002) uses production market as an example to show that markets are created from social networks [31, 32]. White pays more attention to a producer's social network to show how each producer occupies a niche in the market and how, together, these form the social structure of the market. Customers are linked with one another, and their networks help to shape market structure. The efficient way for a firm to reach customers is not to connect to each customer directly but to select specific customers as initiators of product or service, and encourage these initiators to reach other customers through referrals, thereby exploiting the social networks of extant customers.

Not all the customers in a network can bring the same WOM value to a firm. Customers may be differentiated by their strength of relations and types of ties, among other network measurements. Social network scholars define the level of connections or the sum of relationship of an individual as social capital. According to Lin (2001), the notion of social capital assumes that "investment in social relations with expected returns in the marketplace" (p. 19) [33]. Bourdieu (2001) differentiates social capital from economic capital and also shows that the two are interchangeable [34]. An individual's social connections may bring economic benefit for him or her. He/she may also be financially beneficial to firms. For example, asking current employees for job referrals has been a common practice of many firms in hiring [35], and has been proven to be less expensive than other ways of hiring. Social capital at the individual level can be measured by "investment in social relations," such as the number of people one links to, and/or resources (e.g., time) spent with his or her connections. The social capital of customers can help a firm to bring in new customers, and the value added by new customers can be considered as the indirect value of the customers who made the recommendation.

In addition to social capital, a customer's network ties also play important roles in determining its profitability. Customers linked to different groups can be considered as forming weak ties (versus strong in-group ties). Granovetter (1973) has investigated the strength of weak ties in the study of job marketing behavior in the United States [36]. Godes and Mayzlin (2004) have studied online conversations [3]. They highlight "the critical role of weak ties in the diffusion of WOM: any piece of information that traverses a weak, as opposed to a strong tie is likely to reach more people". Weak ties are also important to other kinds of WOM. Through weak ties, customers can help firms in reaching more potential customers, who are in turn more likely to bring in new members and new value. In contrast, people who are very close to one another and linked with strong ties tend to know the same groups of people. They are critical to the survival and well-being of an organization; however, they may contribute less to the growth of the organization, compared with those who linked to other groups or networks with weak ties.

3. RESEARCH HYPOTHESIS

The objectives of this study are twofold. The first objective is to measure and compare the WOM value (i.e., indirect value) of customers to their traditional direct value. By doing so, the importance of the indirect values of customers is emphasized. To be more specific, the customer's WOM value or indirect value is defined as direct values of new customers obtained by the focal customer's WOM or referral.

The second objective is to show how a customer's WOM value is linked to direct measures of its social capital and social ties. A proxy of customer network (illustrated by the

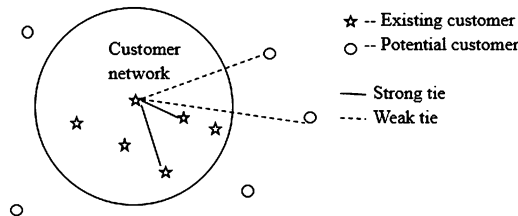


Figure 1. Customer network.

big circle) is shown in Figure 1. The existing customers are represented by stars, potential customers are represented by little circles, and the connections among them are denoted by solid and dashed lines. The connections within the group of existing customers are strong ties (indicated by the solid lines), which cannot bring new customers and new value for the company. However, the connections between existing customers and potential customers are weak ties (represented by dashed lines), which can help the company obtain new customers and thereby produce indirect value. In addition, considering the social capital effect, the total connections a customer may have with other people (existing or potential customers) and their strengths are also important.

In the present study, the total magnitude of links that the customer may have with other people is used to capture his/her social capital. The proportion of weak ties among all connections is used to display customer's social ties. Although weak ties are more valuable for bringing about new customers, strong ties can tighten existing connection among customers, raise commitments of the network, and strengthen motivation to recommend others to join the network. In this sense, both strong and weak ties are necessary to WOM value. Hence, the proper proportion of the two ties is most important for companies. Thus, following the above logic, two hypotheses are developed:

- (H1) The WOM value of customers is positively related to their social capital, especially to the total connections among the focal customers and other people.
- (H2) The WOM value of customers has an inverted U-shape relation to the proportion of customer's social weak ties to potential customers among total links to all the other people.

The two hypotheses are about the relationships between a customer's social network characteristics (social capital and social ties) and their WOM value. Any companies, as long as their customers are individual consumers but not organizations, can apply such hypotheses because the WOM recommendations or referrals are often conducted through a customer's social network. In the present study, the telecom company is served as a special data source which provided the data about customer's WOM behavior and their social network.

4. METHODOLOGY

4.1 Data

The WOM data in this study are drawn from a major wireless provider. From 2007, the service provider launched a CSN plan aiming at strengthening college students' loyalty. The CSN plan is a common practice of this wireless service provider but it has different terms in different regions. This CSN is only for a university in the Sichuan province of China. It mainly outspreads by WOM through recommendations via text messages sent by initiators and confirmed by acceptors. Members in the CSN enjoy a much lower price for all the phone calls made inside CSN: from 0.36 to 0.08 RMB per minute, a 78% percentage deduction in customer's cost per minute. This price change takes effect instantly upon confirming the recommendation text messages. Clearly, the operation of this CSN is quite similar to those social network sites (SNS) such as FaceBook and MySpace.

In September 2009, the company launched a new marketing campaign to encourage the existing customers in the CSN to bring in more people. The initiators are self-selected because they are paid for every successful recommendation they made. According to the wireless provider's policy, the initiator must be an existing member of the CSN, and the acceptor should be a customer of the wireless provider. Not only the entire WOM process but also the revenues generated by a customer before and after joining the CSN network should be recorded in the provider's IT system. Therefore, the customer's consumption difference before and after joining the CSN network is due to referral and can be used as a measure for WOM value. There are 1,200 initiators in October who made a recommendation and all of them got at least one acceptor (the number of acceptors range from 1 to 64). The average number of the acceptors who were recommended by the 1,200 initiators is 1.71.

4.2 Model

To investigate the relationship between customer's WOM value and his/her social capital and social ties, we employ a multiple regression model to capture this issue.

$$\begin{aligned}
 WOM_value &= \beta_0 + \beta_1 Social_capital + \beta_2 Social_ties \\
 &+ \beta_3 Social_ties^2 + \beta Z + \epsilon
 \end{aligned}$$

where *WOM_value* is the value that a customer can bring to the company by WOM, *Social_capital* represents the customer's total connections to the other people, *Social_ties* denotes the proportion of a customer's social weak ties to potential customers outside the CSN among total links to all the other people. *Z* is a vector of control variables that might influence the customer's *WOM_value*, $\{\beta_0, \beta_1, \beta_2, \beta_3, \beta\}$ are the parameters. The specifications and measures of all these variables are discussed in the next session.

4.3 Measurement

Dependent variable—WOM value The students in the CSN were encouraged to make referrals to their friends and got some rewards for every successful recommendation in September. The wireless service provider can record every specific recommendation and whether it is accepted. In this research, 1,200 initiators who successfully made at least one CSN recommendation in the month of October 2009 were examined. The accepters who accepted the referral in October joined the CSN plan and had the new rate in October. Therefore the monthly revenues before (in September) and after (in November) joining the CSN were accurately captured because the accepters are also customers of the wireless provider. The value change (i.e., the revenue in November minus the revenue in September, $\Delta Sum_revenue$) served as a natural measure of the WOM value of the initiator on this particular customer. However, in the telecom industry, most data are non-normal and highly skewed so a log transformation of the revenue is made before the dependent variable is calculated. As such, by summing the WOM values across all accepters, an overall measure was obtained.

Explanatory variables—social capital and social ties Social network scholars have developed formulas to calculate social capital and strength of ties [37, 38]. However, there are proxies for the measurements. In this research, because the sample is comprised of a highly homogenous demographic network group (i.e., college students), directed measures of the network variables were adopted. For example, in the dataset of college wireless-call customer network, customers can make calls within CSN or outside of the CSN. They could also make calls within the service provider's network (SPN) or outside of the SPN. The more minutes an initiating customer uses, the more social capital he or she has because of the investment in social capitals to make such calls. Longer minute calls mean more investments, either by strengthening the extant relationships or by bringing about more relationships. At the same time, the types of calls (i.e., calls made within the CSN and outside of the CSN) are also significant. Calls made outside of CSN, were more likely to the customers who were bridging different groups, in a sense of forming weak ties. With the same logic, calls made outside of SPN might help form weak ties as well. However, these ties have different meanings from the ones within SPN but outside CSN. Because the CSN plan only accepts customers who are already in SPN, calling outside SPN will not help in increasing the WOM value. To explain the dependent variable, the following explanatory variables were collected for each initiator.

TotalCall: This is the total amount of phone calls made by the initiator measured in terms of log-minutes. This variable captures the most basic and important aspect of a customer. Obviously, most phone calls are made between customers with a certain type of social relationship. Naturally, the TotalCall measures the amount of time invested

in social relations. From that perspective, TotalCall can be interpreted as a social capital measure for that particular customer. Note that the CSN service provides discounted rates to its members, as long as the phone calls are made within the CSN. As a result, customers with larger TotalCall values are likely to enjoy the discounted service within the network. Consequently, a positive effect is expected for TotalCall.

OutCSN: Note that those phone calls made within the SPN can be further classified into two groups according to whether or not they are made within the CSN. Such a consideration is a motivation to consider OutCSN, a variable that captures the percentage of the phone calls made within SPN but outside the CSN. Note that initiators are already members of the CSN. As a result, smaller OutCSN value implies that the customer's major social network within the SPN has already been covered by the CSN. Consequently, such individuals are less motivated to recommend the CSN service to their friends. In contrast, for initiators with large OutCSN values, their major social network is still outside the CSN. Neither customers themselves nor the people in their social network have a high commitment to the CSN. Therefore, they are less likely to bring about new customers with high value, so an inverted U-shape relationship is expected between OutCSN and WOM value.

Control variables Lag-revenue: If the revenue generated by customers prior to joining the CSN is already high, the space left for further improvement in terms of revenue may be limited. This creates a heterogeneity issue and might lead to inaccurate parameter estimates. As a result, for a more accurate estimate of the interested regression coefficient, controlling the customer's revenue (in log-scale) prior to joining the CSN is important.

OutSPN: Among all the phone calls made by a customer, some may be made outside the SPN. In other words, the customer may make calls to other service providers, which are very likely to be the current company's direct competitors. Then, variable of OutSPN captures the percentage of the phone calls made outside the SPN. Obviously, a customer's high OutSPN value implies that their major social network is not fully covered by the SPN. A necessary condition for an individual to join the CSN is that he/she must be an existing member of the SPN. As a result, customers with high OutSPN may find it awkward to recommend CSN service to their friends who are out of the SPN. As a result, a negative effect is expected. According to the above variable specification, we obtain the following model:

$$\begin{aligned} Sum_ \Delta \log(Revenue) &= \beta_0 + \beta_1 TotalCall + \beta_2 OutCSN + \beta_3 OutCSN^2 \\ &+ \beta_4 Lag_revenue + \beta_5 OutSPN + \epsilon \end{aligned}$$

Table 1. Descriptive Analysis

Variables	Mean	S.D.	Min	Max	Median
<i>Revenue</i>	58.16	40.16	0.00	336.25	47.49
<i>TotalCall</i>	570.63	570.25	6.00	3990.00	383.00
<i>OutSPN</i>	0.15	0.15	0.00	0.90	0.10
<i>OutCSN</i>	0.75	0.21	0.03	1.00	0.80
$\Delta Sum_Revenue$	16.22	66.44	-598.45	392.85	6.98

5. RESULTS

5.1 Descriptive analysis

As the first step of the analysis, descriptive measures of a customer’s direct and WOM values need to be determined. The customers’ WOM value is comparable to their direct values in terms of mean. Simple calculation reveals that the ratio of those two means is approximately 28% (16.22 vs. 58.16 RMB).

The customers who joined the CSN enjoyed a much lower price for all calls made inside the CSN (78% percentage deduction) so they made much more calls than before because of the lower price. However, the incremental calls that they made are not all within the CSN but most of them are outside the CSN (see table 1). In fact, customers didn’t know exactly who is in the CSN and who is not among their friends in the same university. As a result, they paid more after joining the CSN than before. Thus, ignoring a customer’s WOM value leads to a serious underestimation of the customer’s value. Such an empirical finding corroborates the necessity of the subsequent regression analysis. A simple descriptive analysis of all the explanatory variables is also provided here (Table 1). A customer makes phone calls totaling 570.63 minutes on average per month, which represents the total revenue of approximately 58.16 RMB. Among all those phone calls, only a small number (approximately 15%) are made outside the SPN. This is because the service provider is one of the largest service providers in China. Approximately 75% of *TotalCall* is made outside the CSN but within SPN. This number is appreciable, which implies that there still exists a good growth potential for the CSN.

5.2 Regression results

We apply the above regression model to the data from the telecom service provider. Regression results and coefficients are reported in Table 2.

The results show that the regression model provides an acceptable fit to the data with R-squared of approximately 28%. Next, the estimated regression coefficient is interpreted through the following steps. First, the coefficient of *TotalCall* is estimated to be positive and significant. This suggests that the heavier users have higher WOM value. Actually they obtained more successful recommendations ($n = 2.7$) than what the other customers got ($n = 0.9$) so that

Table 2. Regression Results

	<i>Estimate</i>	<i>SE</i>	<i>Pr > t </i>
<i>Intercept</i>	1.14	0.22	<.001
<i>TotalCall</i>	0.05	0.02	0.005
<i>OutCSN</i>	1.83	0.74	0.004
<i>OutCSN2</i>	-1.83	0.80	0.006
<i>Lag_revenue</i>	-0.38	0.02	<.001
<i>OutSPN</i>	-0.22	0.18	0.205
F-test		87.72	
Significance		<0.001	
R Square		0.282	

the customers recommended by heavier users brought more revenue to the service provider together. Second, the coefficient of *OutSPN* is not statistically significant, which suggests that the empirical evidence is not sufficient to support an affirmative conclusion that *OutSPN* negatively influences WOM value. Finally, both the coefficient for *OutCSN* and *OutCSN²* are statistically significant. In particular, the coefficient for *OutCSN* is positive (1.83), whereas that for *OutCSN²* is negative (-1.83). This suggests an inverted U-shape relationship between *OutCSN* and WOM value, with the largest WOM value occurring at *OutCSN* value of approximately 0.5. This means that WOM reaches its best value when 50% of calls are made outside of CSN, with all other things controlled. Such an interesting finding suggests that the initiators who can bring the largest WOM value to the entire network are neither those with very large *OutCSN* value (i.e., very strong tie within the CSN) nor those with very small *OutCSN* value (i.e., no ties within the CSN). In fact, customers with a medium proportion of weak ties (i.e., *OutCSN* = 50%) are likely to bring the largest revenue to the service provider. Such an interesting finding seems to strongly corroborate the weak tie theory of Brown and Reingen (1987) [30].

6. CONCLUSION AND DISCUSSION

By focusing only on direct value, the traditional definition of customer value ignores a customer’s indirect value that comes from WOM. Aside from his/her direct purchases, a customer may contribute profits to the firm by introducing new valuable customers. Despite the importance of WOM for customer valuation, little relevant research has been done in the past. To fill up the gap, the real customer and referral data of a major mobile service provider in Mainland China are used to investigate this issue.

As a loyalty plan, a wireless provider launched a College Student Network (CSN) whose members enjoy a much lower price for all the phone calls made inside the network. To promote this plan, the existing members are encouraged to tell their friends to join the CSN. Thus, an existing CSN member might contribute to the firm in two different ways: using the firm’s mobile phone services (direct value) or bringing

other valuable customers (WOM value). The total consumption change of all the new customers before and after joining the network is used to measure the WOM value. Statistical results show that a customer's WOM value is comparable to their direct values in terms of median. Therefore, ignoring the WOM value underestimates the customer's value.

Furthermore, a regression analysis was conducted to test the hypotheses on relationships among WOM value, social capital, and social ties. According to the results of the empirical analysis, the two hypotheses are both supported. Firstly, a customer's WOM value is positively related to his/her social capital, as measured by the total amount of phone calls. Therefore, customers with more phone calls are likely to generate better WOM values. Secondly, the proportion of weak ties within the customer's social network has an expected inverted U-shape relation with the customer's WOM value. This means neither large nor small proportion of weak ties, as measured by the percentage of phone calls made outside of the CSN, lead to the best WOM value. Instead, customers with median proportion of weak ties have the highest WOM values.

Theoretically, the empirical findings in this study extend the previous understanding on customer value from direct value to indirect value of WOM. These also provide some insights on the antecedents of WOM value from a social network perspective by linking the social capital and social ties of customers to their WOM value. In practice, the conclusion also has important implications to customer relationship management. On one hand, considering WOM value, companies should pay more attention to the customers with low purchasing profitability but higher WOM value, thereby obtaining long-term benefits. On the other hand, companies can improve their referral campaigns by giving more emphasis or special incentives to the customers who have moderate relationships with the existing customer network, encouraging such customers to introduce more customers who are valuable, thereby generating more WOM value.

This research has also some limitations due to the weakness of the dataset. First, the dataset covers only a three-month period before and after the new consumer joins the CSN. However, a recent study has demonstrated that, compared with other customers, customers induced by WOM are more valuable in terms of long-term profitability [1]. Moreover, the main purpose of the CSN plan is to involve more and more college students to be in the CSN. The more students in the CSN, the more cost reduction they would get. As most people of the customer's social network are in this plan they are less likely to leave because the transition cost is very high. However, in fact we didn't address the loyalty issue in the present study. Further research should use longer period data to examine the long-term value of WOM. Second, in this research, the total revenue change of all the customers coming from WOM is used as the measure of indirect value. Therefore, whether the indirect value results from the increasing amount of new customers or the consumption change of each customer cannot be specified. In

future research, more detailed information should be investigated than before. According to the theory of social network, the question of whether the introduction of new customers would change the structure of the customer's network, and consequently their behavior model and profitability, is an interesting research endeavor for the future.

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