

# THE EFFECT OF THE ONLINE SOCIAL NETWORK STRUCTURE CHARACTERISTICS ON NETWORK INVOLVEMENT AND CONSUMER PURCHASING INTENTION: FOCUS ON KOREAN SOCIAL PROMOTION SITES

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## ABSTRACT

The study aims to understand how the characteristics of online social network structure (tie strength, network density, network centrality and homophily, etc.) can impact consumer purchase intention through network involvement. This study focuses on social promotion sites (social commerce sites) like TicketMonster which is the most popular deal-of-the-day website in South Korea etc. These sites have a social aspect. Each promotion is valid only if a certain minimum number of consumers purchase the deal, and the news of these deal-of-the-day websites spreads virally through Facebook updates and Twitter tweets or other social network sites on a daily basis as people encourage family, friends and others within their social networks to sign up for the offer, so that the deal becomes available to all. So we propose and analyze that a consumer's decision for purchasing in the deal-of-the-day websites is affected by the characteristics of the online social network structure through consumers' network involvement. The results of this study are: Strong ties with friends can increase their affective involvement to the network. And network density, network centrality and homophily can both increase SNS users' affective involvement and cognitive involvement to the online social network, both of which can increase their purchase intention to the recommended deals by their friends in SNS.

**Keywords:** Online social network, Social commerce, Purchase intention, Network involvement

## 1. INTRODUCTION

Since we use the internet as a commercial instrument, most of the offline retailers have set up online retail stores directly or by third-parties to increase revenues. Nowadays we can see a special phenomenon that lots of e-commerce sites using SNS (social network services) as online shopping tools to post customer ratings, reviews, and user recommendations. They utilize SNS as the effective WOM tools for consumers to share the shopping information and experiences.

SNS (social network service) is a web-based individual – centered service, platform, or site that focuses on building

and reflecting of social networks or social relations among people. Facebook, MySpace, Cyworld, Twitter, and so forth are the most popular social network sites. They are virtual communities which allow people to connect and interact with each other on a particular subject or to just “hang out” together online [1], and where everyone is welcome to join through a simple register process, these sites typically allow members to create an online profile containing self-descriptions, react to the profiles of other members, and become “friends” with other members [2][3]. Participants may use the sites to keep in touch with existing friends or to meet new people [2]. By 2011, the world's largest social network site – Facebook has reached 700 million users and has more than 500 million active users. Social network sites have three common elements. They allow individuals to (1) construct a public or semi-public profile within a bounded system, (2) articulate a list of other users with whom they share a connection, and (3) view and traverse their list of connections and those made by others within the system [4].

Besides the online social network sites, the mobile social network service is also becoming more and more popular for the fast developing of smart phones. “Kakao Talk”, the most popular mobile messenger application in South Korea, was launched in March, 2010. In a year, it has more than 10 million users. Over 100 million messages are sent and received through Kakao Talk daily. It is the mobile social network service which recommends friends to the user by their contact information in their smartphone, or directly added by the users' ID. This function can lead to easy establishing a real social network through the application.

Wikipedia defined social commerce as a subset of electronic commerce that involves using social media, online media that supports social interaction and user contributions to assist in the online buying and selling of products and services [44]. In brief social commerce is the use of social networks in the context of e-commerce transactions. Nowadays, we call the social promotion sites like Groupon which is the largest deal of the day website in USA and TicketMonster which is the largest deal of the day website in South Korea and other similar sites as social commerce. These sites are the integrated form of SNS, electronic commerce and group buying.

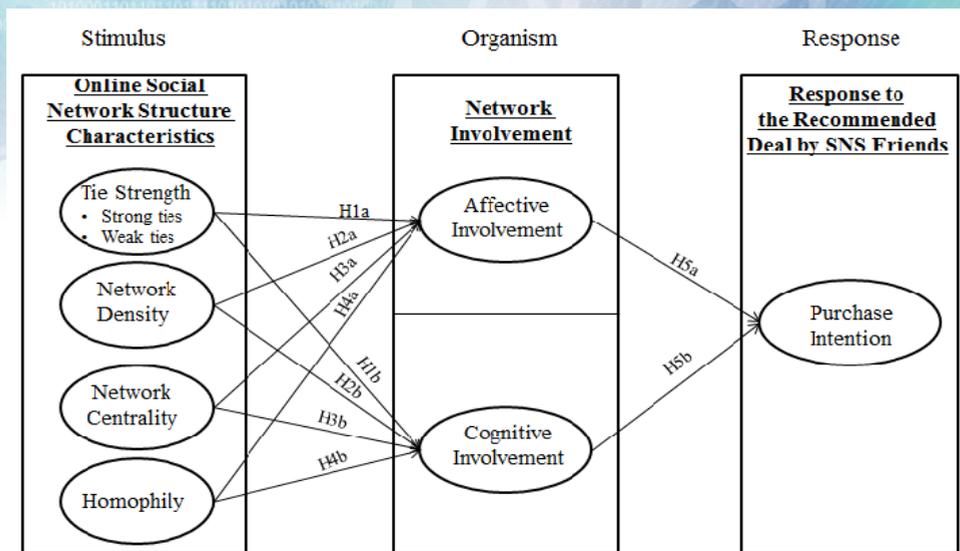


Fig.1 Research model

These sites have a social aspect. Each promotion is valid only if a certain minimum number of consumers purchase the deal, and the news of these deal-of-the-day websites spreads virally through Facebook updates and Twitter tweets or other social network sites on a daily basis as people encourage family, friends and others within their social networks to sign up for the offer, so that the deal becomes available to all. Social commerce can (1) make consumers' collaboration easier, (2) make a more rational purchase decision, and (3) make the shopping focused on consumers instead of products by using the SNS.

The purpose of our study is to investigate the SNS structure characteristics and how these characteristics can affect the consumers' network involvement which may lead to increase purchase intention to the recommended deals by other friends through SNS. We focus on the people who have used the SNS (like Facebook, Twitter, Cyworld, Me2day, or mobile SNS like Kakao Talk etc.) in South Korea.

The article is organized as follows. First, from the existing literature the model and hypotheses are developed. We discuss the influences of four types of network structure characteristics (tie strength, network density, network centrality and homophily). Then the impact of these characteristics on network involvement, and purchase intention to the recommended deals by the friends in SNS are discussed. Next, we describe the data and empirical analyses used to test the model and hypotheses. Finally, results, conclusions, discussions, limitations and future research directions are discussed.

## 2. THEORETICAL FRAMEWORK AND RESEARCH HYPOTHESES

In this research, we attempt to develop an in-depth

understanding of how online social network structure characteristics influence individuals' responses to the social commerce sites' deals recommended by their online social network friends. To do so, we begin with a discussion of the Stimulus-Organism-Response(S-O-R) framework. The S-O-R framework posits that environmental cues act as stimuli that affect an individual's cognitive and affective reactions, which in turn, affect behavior [5]. Stimulus may include the factors like store environment, product display etc. in the offline store [6] and the web design, posts, etc. in online store [7]. Organism refers to the individual's cognitive and affective states. And responses include nonverbal responses such as galvanic skin responses, verbal responses like word of mouth communication. And also the behavior responses like acquisition, usage, etc. belong into this realm [6]. Following S-O-R framework, this study operationalizes "stimulus" as the online social network structure characteristics (i.e. tie strength, network centrality, network density, and homophily), "organism" as network involvement (cognitive and affective) and "response" as the purchase intention to the recommended deals by online social network friends. See the Fig.1 for a summary of the research model.

### 2.1 Tie strength

Tie strength is a "combination of the amount of time, the emotional intensity, the intimacy (mutual confiding) and reciprocal services which characterize the tie" [8]. The strength of tie is different by the interaction frequency, quality and the quantity among network members. For the different degree of the tie strength, it can be divided into strong ties and weak ties [9]. Granovetter (1982) [10] noted that weak ties provided people with access to information and resources beyond those available in their

own social circles; but strong ties have greater motivation to be of assistance and are typically more easily available. Weak ties distribute information more efficiently than strong ties since strong ties tend to be intra-clique and so less likely to provide new information [8]. Weak ties have some advantages to provide new information, while strong ties more focus on the mobilization, which means that if you need and ask someone for help, they will be willing to help you anytime and always not refuse the request. People in insecure positions are more likely to resort to the development of strong ties for protection and uncertainty reduction [10]. Strong ties constitute a base of trust that can reduce resistance and provide comfort in the face of uncertainty [11]. Weak ties are those who know each other, but don't meet a lot. So from the weak ties, it is easy to get some new and useful information which are difficult to get from the strong ties, because of they meet each other frequently, and know each other and the information around them a lot. From the antecedent research, we think the strong ties can provide the emotional support and weak ties may give some utilitarian information in online social network. Therefore, we hypothesize that:

H1a. The tie strength (strong ties) will increase the SNS users' affective involvement to the network.

H1b. The tie strength (weak ties) will increase the SNS users' cognitive involvement to the network.

## 2.2 Network density

Tie strength is individual characteristic of the network members, but density can be the whole network's characteristic, which means connection degree of all the members. The best network density is all the members are connecting with each other in a network. Network density reflects the average strength of relations in a network [12]. High levels of network density is useful for making the norms and values among network members by tacit behavior and expectation, because all the people are knowing each other very well [13]. High levels of information sharing among members of a dense network result in shared beliefs [14] and high levels of consensus among network participants [15].

There are three characteristics of high density network referred by Son [16]. First, high density can lead to much more channels to collect and diffuse the information, so the information and resources flow will be very fast. Second, it is so easy to share the norms, establish reliability and do the mutual imitation, etc. And third, it is very effective for sanction of breaking the promise because the evaluation by others can be delivered very easily and quickly to all the network members. In our study, we posit that the network density can affect the SNS users' network involvement for the high network density can lead to gain

the information easily and establish higher reliability among members in online social network. Therefore, we hypothesize that:

H2a. Network density can increase the SNS users' affective involvement to the network.

H2b. Network density can increase the SNS users' cognitive involvement to the network.

## 2.3 Network centrality

Centrality indicates the degree to individual's central position in a network. A person who is in a position that permits direct contact with many others should begin to see himself/herself and be seen by those others as a major channel of information, and he/she is likely to develop a sense of being in the mainstream of information flow in the network [17]. A central agent occupies a position of prominence for at least a portion of an agent network [18], influencing information flows and behavioral expectations among other agents [19]. Centrality was used to evaluate an actor's prominence [20] or power [21]. There are three types of centrality, stating that degree centrality, closeness centrality, and betweenness centrality. Degree centrality defined by the number of ties he or she has with other actors in the network [19]. Closeness centrality defines an actor's ability to access independently all other members of the network, and betweenness centrality was defined as the extent to which an actor has control over other actors' access to various regions of the network [17]. Based on these researches, we can find that a person in a central position can gain information easily and deliver information quickly, also will have more power than other network members. From the research of Richmond (1990) [22], we can find out that power is associated with cognitive and affective learning. Therefore, we hypothesize that:

H3a. Network centrality can increase the SNS users' affective involvement to the network.

H3b. Network centrality can increase the SNS users' cognitive involvement to the network.

## 2.4 Homophily

The homophily means group composition in terms of the similarity of members' characteristics which refer to social identities that are attached externally to individuals (e.g., gender, race, or age) or to internal states concerning values, beliefs, or norms [23]. The similarity of individuals leads to a greater level of interpersonal attraction, trust, and understanding, and consequently, greater levels of social affiliation than that would be expected among dissimilar individuals [24]. From this perspective, we can find that the similarity of individuals can offer some emotional

supports. The principle of homophily is that people who are similar in sociodemographic characteristics are more likely to interact with each other than are people who dissimilar [25]. People associate with similar others because of easeful communication, shared cultural tastes [26] and other features that smooth the coordination of activity and communication [27]. From this perspective, homophily might relate to the cognitive process. In our study we assumed that SNS users have the similar interests with their SNS friends, which can affect their network involvement. Therefore, we hypothesize that:

H4a. The homophily can increase the SNS users' affective involvement to the network.

H4b. The homophily can increase the SNS users' cognitive involvement to the network.

### **2.5 Network involvement and purchase intention to the recommended deals by friends through SNS**

Involvement is defined as a person's perceived relevance of the object based on inherent needs, values and interests [28]. Two aspects of network involvement are investigated: affective involvement and cognitive involvement. Cognitive involvement is associated with "rational, thinking" and is induced by utilitarian or cognitive motives [29]. Affective involvement is associated with "emotional, hedonistic" and is derived from value-expressive or affective motives [29].

McMillan (2003) [30] showed that the involvement with the website is positively related to the attitude towards websites which in turn influences consumers' intention to purchase at the website. Eroglu (2003) [31] demonstrated that consumers' cognitive states and emotional feeling states have an impact on shopping outcomes. In our study, we focus on the SNS users' involvement with their online social network, and high affective involvement to the network will lead the positive feeling to their online social network, and high cognitive involvement will improve the efficiency of information processing on their social networking service. Positive feeling states include "happy" and "satisfied" [32] are positively relate to the attitude toward their friends' activities in the social network. Therefore, we hypothesize that:

H5a. Affective involvement to the network can increase SNS users' purchase intention to the recommended deals by online social network friends.

H5b. Cognitive involvement to the network can increase SNS users' purchase intention to the recommended deals by online social network friends.

## **3. RESEARCH METHOD**

### **3.1 Data collection**

Data was collected from online and offline in Korea. 178 surveys were received from college students, and 23 surveys were received by online survey system. In order to get more appropriate data, we just focus on the people who had the SNS using experiences. In a total of 201 respondents, there are 2 people who didn't use SNS before, so we ignored their respondents. Among the respondents 54.8% were male and 45.2% were female. There are 92.5% respondents are using Cyworld which is the most popular SNS in South Korea, and 34.2% are using Facebook, 67.3% are using Twitter; Mobile SNS is very popular these days in Korea, there are 74.4% people are using Kakao talk which is the most popular mobile messenger in Korea. Among the respondents, there are 42.2 % respondents had social commerce sites using experiences. And there are 183 Korean, 14 Chinese, 1 Spanish, 1 Taiwanese in our respondents.

### **3.2 Measurement**

Numerous prior relevant studies were reviewed to ensure that a comprehensive list of measures was included. The majority of the scale items were adopted from the existing literature but adapted to this study. Tie strength (5 items) measures are obtained and modified from Granovetter (1973) [8] and Petroczi (2007) [33]. Network density (6 items) and network centrality (4 items) measures were adapted from Anita and Fraizer (2001) [34]. Items for measuring the homophily (5 items) were adapted from McPherson (2001) [27]. Both affective network involvement (5 items) and cognitive network involvement (5 items) were adapted from Zaichkowsky (1994) [35]. Purchase intention to the recommend deal by friends in SNS (4 items) were obtained from (Li et al., 2002) [36]. The scale items used seven-point semantic differential scales. Items with low loadings on the corresponding construct were eliminated to enhance the reliability of measures.

### **3.3 Statistical Analysis**

The structural equation modeling (SEM) approach was used to validate the research model. This approach was chosen because of its ability to test casual relationships between constructs with multiple measurement items [37]. Lisrel 8.8 will be used in this study to test the study's hypotheses, and before this we also use SPSS 18.0 to do the exploratory factor analysis and reliability test.

## **4. RESULT**

### **4.1 Test of reliability and confirmatory factor analysis (CFA)**

We first run an exploratory factor analysis on all 34 items

**Table 1**  
Results of CFA for each constructs

Constructs	Indicators	Standardized factor loadings	Standard deviation	t-value	Cronbach $\alpha$	AVE	CR
Tie Strength	x1	0.80	0.36	12.54	0.785	0.649	0.784
	x2	0.81	0.34	12.74			
Network Density	x3	0.85	0.28	13.65	0.793	0.659	0.794
	x4	0.77	0.40	12.11			
Network Centrality	x5	0.94	0.12	16.56	0.922	0.859	0.924
	x6	0.91	0.16	15.98			
Homophily	x7	0.83	0.31	13.88	0.888	0.736	0.893
	x8	0.83	0.31	13.89			
	x9	0.91	0.17	16.00			
Affective Involvement	y1	0.91	0.16	16.53	0.925	0.805	0.925
	y2	0.91	0.17	16.45			
	y3	0.86	0.25	15.06			
Cognitive Involvement	y4	0.91	0.16	16.37	0.928	0.869	0.930
	y5	0.95	0.10	17.36			
Purchase Intention	y6	0.94	0.11	15.05	0.930	0.874	0.933
	y7	0.92	0.14	14.72			
Chi-Square = 149.41(P=0.00)	DF = 83	GFI = 0.91	CFI = 0.99	NFI = 0.97	AGFI = 0.86	RMR = 0.041	RMSEA = 0.064

**Note:** CR – composite reliability, AVE – average variance extracted

by SPSS to assess their dimensionality, factor structure, and measurement properties. Some items are eliminated because of cross loadings and low coefficients. As a rule of thumb, a measurement items loads highly if its loading coefficient is above 0.6 and does not load highly if its loading coefficient is below 0.4 [38]. In our study, we eliminated all the items which are below 0.6. Construct reliability was assessed using Cronbach's alpha value. Nunnally (1978) [39] recommends that the Cronbach alpha

of a scale should be greater than 0.7 for items to be used together as a construct. Therefore, all our constructs are in the acceptable range as shown in Table 1. Then, we run CFA by Lisrel 8.8. The results were shown in Table 1, and demonstrate good measurement fit: the chi-square value is 149.41 (df = 83), CFI, GFI, and NFI have the values of 0.99, 0.91 and 0.97 are higher than 0.9, RMSEA's value is 0.064 which is less than 0.08. The model fit parameters are in the acceptable range [40].

**Table 2**  
Discriminant validity

	Tie Strength	Network Density	Network Centrality	Homophily	Affective Involvement	Cognitive Involvement	Purchase Intention
Tie Strength	<b>0.81</b>						
Network Density	0.63	<b>0.81</b>					
Network Centrality	0.55	0.60	<b>0.93</b>				
Homophily	0.60	0.57	0.59	<b>0.86</b>			
Affective Involvement	0.51	0.52	0.51	0.51	<b>0.90</b>		
Cognitive Involvement	0.46	0.59	0.55	0.54	0.73	<b>0.93</b>	

Purchase Intention	<b>0.38</b>	0.29	0.30	0.30	0.41	0.39	<b>0.94</b>
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Notes: Bolded diagonal elements are the square root of AVE for each construct off-diagonal elements are the correlations between constructs.

**Table 3**  
Results of hypotheses

H	Hypothetical Path	N	Path Coefficient	T-value	Accept/Reject
H1a	Strong Ties→Affective Involvement	11	0.17	2.13	Accept
H1b	Weak Ties →Cognitive Involvement	21	-0.01	-0.08	Reject
H2a	Network Density→Affective Involvement	12	0.20	2.45	Accept
H2b	Network Density→Cognitive Involvement	22	0.33	4.26	Accept
H3a	Network Centrality→Affective Involvement	13	0.19	2.51	Accept
H3b	Network Centrality→Cognitive Involvement	23	0.23	3.05	Accept
H4a	Homophily→Affective Involvement	14	0.18	2.36	Accept
H4b	Homophily→Cognitive Involvement	24	0.22	2.98	Accept
H5a	Affective Involvement→Purchase Intention	11	0.25	2.68	Accept
H5b	Cognitive Involvement→Purchase Intention	12	0.21	2.17	Accept

Note:  $p < 0.05$

For the convergent validity, all factors should have the average variance extracted (AVE) higher than 0.50 and composite reliability (CR) should higher than 0.70 [41]. Convergent validity indicates the extent to which the items of scale that are theoretically related to e each. As table 1 shown, all AVE and CR values of the items are acceptable.

Discriminant validity was assessed to ensure whether the construct is different from others. In this measurement, the square root of the AVE for each factor should be higher than diagonal are higher than the correlations between the factor and other factors [41]. As shown in Table 2, the square roots of AVE which are in bold, it demonstrates adequate discriminant validity of all constructs.

**4.2 Test of hypotheses**

We used the structural equation modeling (SEM) approach in our data analysis to test the structural and measurement models. Table 3 shows the results of hypotheses testing. Most of the hypotheses were supported except the H1b, weak ties had no significant influence on the cognitive involvement to the online social network. Purchase intention to the recommended deals by other SNS users was explained by the network involvement – affective involvement ( $\beta_{11} = 0.25, p < 0.05$ ) and cognitive involvement ( $\beta_{12} = 0.21, p < 0.05$ ), providing support to H5a and H5b. Affective involvement was influenced by tie strength (strong ties) ( $\beta_{11} = 0.17, p < 0.05$ ), network density ( $\beta_{12} = 0.20, p < 0.50$ ), network centrality ( $\beta_{13} = 0.19, p < 0.05$ ) and homophily ( $\beta_{14} =$

$0.18, p < 0.05$ ), providing support to H1a, H2a, H3a and H4a. And Cognitive involvement was influenced by network density ( $\beta_{22} = 0.33, p < 0.05$ ), network centrality ( $\beta_{23} = 0.23, p < 0.05$ ) and homophily ( $\beta_{24} = 0.22, p < 0.05$ ), providing support to H2b, H3b and H4b.

**5. CONCLUSION AND DISCUSSION**

This study investigates the effect of consumers’ online social network structure characteristics on their network involvement which might affect their purchase intention to the recommended deals by their friends in SNS. We adopt four types of network structure which are tie strength, network density, network centrality and homophily. The results show that all these characteristics have positive effects to the consumers’ affective network involvement and cognitive network involvement except weak ties, and their affective and cognitive involvement, both of which can increase their purchase intention to the recommended deals by their friends in SNS. Let’s rethink about why weak ties don’t have some effects on the online SNS users’ network involvement.

Weak ties are generally infrequently maintain, non-intimate connections, this is focus on the offline, maybe for some reasons that someone couldn’t reach their old friends, so it’s difficult for them to exchange information, so we use this background to assumed that online social network users who are weak ties also can offer some new information like offline networks. But weak ties may be affected positively

when the medium expands the reach and basis for initiating and maintaining ties, providing a means through which previously unconnected individuals can now initiate contact [42] [43]. Especially in SNS, it is a two-way communication environment. Even you don't need to find some information on your own initiative, you can receive all the information that your connected friends in your SNS have done. So in SNS environment, people may think there is not so much weak ties because they are all connect with each other all the time, and can easy reach anyone any time.

From this study, we find out that the integrate SNS with electronic commerce can increase the consumers' purchase intention, and have positive effects to the online sellers. Also the results show the reason why the deals recommended through SNS can increase the profit. We have proved that it is affected by the consumers' network structure characteristics which we referred in this study, like strong ties with other SNS members, users' network density, network centrality, and the homophily with others. We suppose that corporates should be integrated with SNS either online or offline, and pay more attention to the SNS marketing to manage the WOM and customer relationship. Also, marketers can utilize the users' characteristics to find the information leader in the network for more effective marketing.

## 6. LIMITATIONS AND FUTURE RESEARCH

This study has several empirical and theoretical limitations, which call for further research. First, when we study the SNS users' social network characteristics we didn't use the social network analysis approach which was the standard tool for analyzing one's social network. Future research should use SNA approach to do more accurate analysis of SNS users' social network structure. Second, we just focus on the characteristics of the network structure, but not some other factors that can lead to the purchase intention in social commerce sites. Some other factors like individual's personality, cost, perceived risk, innovativeness, and SNS using experience or social commerce sites' shopping experience and so forth might be useful in further explaining of the purchase intention in the social commerce sites. Third, in our study we just measure the conative response as purchase intention, some more marketing effects should be studied in the future research. Fourth, in our research we collected the data from SNS users, but didn't take care of whether they have social commerce sites using experience. In order to get more accurate data, it's necessary to get more social commerce sites users' data in the future research. And a larger sample size will be helpful in reflecting a more precise measurement of the research model.

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