

Research on Evolution Mechanism of Consumers' Implicit Demand Based on Social Commerce Model

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Abstract—At present, social commerce enterprises take some measures to guide consumption based on the social scene mode, in which consumers' purchasing experiences could be advisor. However, although the enterprises have realized the importance of digging or satisfying consumers' demands, currently the evolution mechanism of implicit demands using is still not perspective, which leads to the barrier of further development of enterprise. This paper defined the concepts and features of consumers' implicit demands and introduced its mode of evolution, and then according to the explicit degrees of their demands, we divided the consumers into 4 different types, adopting the method of algorithm. Afterwards, the system dynamic model of evolution mechanism of consumers' implicit demand was established on analysis of the influencing factors on input for transformation of different types of consumers. Finally, on the basis of analysis on predetermination and key-factors of the simulation, the paper put forward practical advices for social e-commerce operation and long-term development of relevant enterprises, which will do help to provide practical advices for performance improvement, aiming to make it become the guiding force of promoting long-term development of enterprises.

Index Terms—Implicit demands, Evolution mechanism, Social Commerce, System dynamics

I. INTRODUCTION

In the past ten years, with the development of electronic commerce, the consumption habits of consumers are also changing. However, in spite of great convenience the booming online shopping market take to the consumers, accompanied risks of online shopping is also becoming the hidden danger to the development of electronic commerce. Therefore, in order to resolve this contradiction, consumers began to exchange commodity information through social media, aiming to use the public's sharing wisdom spread by word of mouth to break down barriers in e-commerce market, which can be more efficient guiding force in the growing online shopping market to make purchasing decisions.

Thus, the web 2.0 of e-commerce and social media combined and formed a new business model, called social commerce.

Along with the maturing of social media technology, the social e-commerce has become a new kind of

transformation. In a sense, social commerce could be seen as a child model of e-commerce. Based on social interaction and UGC, social commerce websites provide guiding information for users to complete the transaction online. As a new connection channel between electricity and consumers, the social commerce gain benefits mainly by clarifying the customers' shopping demands for electricity drainage, compared with traditional electricity commodity circulation positioning. Therefore, on the basic of the understanding about the evolution mechanism of consumers' implicit demand, social e-commerce websites can effectively identify the core focus of policy and adopt the appropriate strategy to improve the investment portfolio, which will finally do help to improve the efficiency of the e-commerce transaction.

Currently, in foreign countries, social media for business activities such as Facebook and Twitter are the represent of the social e-commerce. And in the domestic, social e-commerce model also has its own characteristics, among which the "Taobao" agitation led by Alibaba.CN in 2006 is a good example. Exposed to the complex online shopping environment, especially facing with the massive commodities on "Taobao", consumers have great difficulties on making purchasing decisions. At the same time, some entrepreneurs and businessmen who gradually realize practical significance of such business model have set up special media space, basing on the recommendations aiming to benefit from it. Since then, with the further development of social commerce, the model changed gradually from price-basing recommendations to other forms, with "Mushroom Street" and "SMZDM.cn" as typical examples.

In the process of development of social commerce, the recommendation model developed from price-driving to content-driving and even the scene-driving. However, no matter what forms it takes, the social commerce is still faced with many problems, which accounts for the necessity to understand the satisfaction of customers shopping desire and their implicit demands. Therefore, how to manifest the implicit demands of users on social

e-commerce is one of the important problems managers need to resolve in order to occupy the market.

Therefore, to analyze and excavate consumers' potential demands, this paper use the method of system dynamics, based on the social commerce model, to define the electronic commerce environment on the connotation and characteristics of consumers' implicit demands, and the introduce its evolution model. Furthermore, K-means algorithm was used for consumers clustering analysis and we finally summed up four different types of them. According to the above analyzing research, the system dynamics model was established to describe and analyze the influencing factors of different types of consumers, and their evolution regulation as well. At last, relevant countermeasures and suggestions are put forward, on the basis of the result of the research.

II. LITERATURE REVIEW

A. Research Status of Social E-Commerce

On the analysis of the recent literature and research about social e-commerce, social e-commerce is defined as a kind of online e-commerce platform on which users can collaborate and obtained shopping advice from others. And then the consumers complete the transaction through the diversion in target. Besides, three key attributes of socialization e-commerce are summed up, which include the business practices, social media technology and group interaction.

According to market researching report form e-Marketer, by 2015, they will invest more than \$200 as their top priority to promote social network. At the same time, it was forecast to the amount of social network advertising will be steadily improving, which will be even more than doubled to 2017, sharing 20% of the whole digital advertising.

In the academic field, there are also many scholars focus their consideration on social commerce. Researches on the design model of e-commerce, impact of information gaining access and trading behaviors have achieved some valuable results.

B. Research Status of Implicit Demands

The concept of implicit demand was first mentioned in1987, and nowadays the specific definition of implicit demand is still vague, as different scholars use different terminology to elaborates the connotation of implicit demand. But in essence, there is convergence existing in their defining standards, for example, all of them will agree that implicit demand is needs that is unable to articulate.

In order to understand the implicit demand, we should realize the fact that the implicit demand does not exist in isolation, but attached to the explicit demand and influence each other. On the other hand, it's stated that the implicit demands will be distinguished based on the characteristics of individuals, groups and organizations. At present, the view that the research on the definition of implicit demand can be based on two dimensions including information cognition and value perception, is more recognized in the academic field.

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III. ANALYSIS ON CHATACTERISTICS OF IMPLICIT DEMANDS

A. The Hierarchy of Implicit Demands in Social E-Commerce

On the basis of literature study, we will divided the consumers' demands into four different levels, including the expression, recognition, consciousness and objectivity layers, according to the theory of information perception and value cognition. Besides, we analyze its characteristic connotation on the foundation of different degrees of implicit latent demands from shallow to deep.

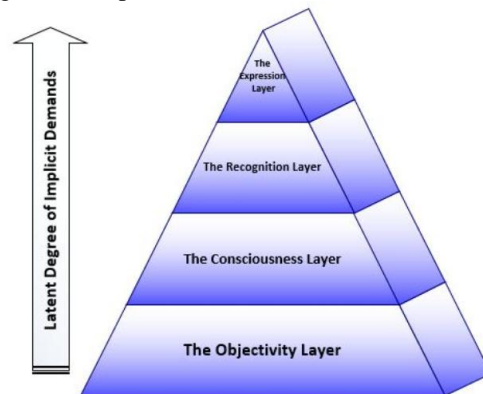


Figure.1. Hierarchy of Implicit Demands in Social Commerce

1. The expression layer of implicit demands (EL)

As the top level of the implicit demands hierarchy model, the expression layer possesses the least relative consumers' quantity, which can also be described as manifest implicit-demand. On the observation and analysis of inherent law of consumers' demands for information on commodities online, the expression layer of the consumers' recessive demand for related certification information, that can be truly identified in the process of social e-commerce mode of operation.

In general, relevant e-commerce websites manifest the implicit demands of seed-users who possess high value perception by encouraging them publish more original

articles, in terms of information processing requirement. Therefore, we choose "quantity of original articles" to be the measure index, in order to quantitatively analyzing the expression layer in implicit demands of consumers.

2. The recognition layer of implicit demands (RL)

The recognition layer locates at the second top layer of the hierarchy pyramid model, with the second more quantity, which is less than the expression layer only. This kind of distribution form conforms to the information processing of cognitive logic. As the consumers' demands belonging to the recognition layer is still on its "non-manifestation" stage, the utilization rate is low. As for social e-commerce model, to satisfy the consumers' recessive demands for knowledge and information on commodities can be regarded as the original motive of its existence.

The browsing, information gathering, purchasing behaviors of consumers on social e-commerce websites are mostly with confirm target or aim. These behaviors will be capable to lead divertingly consumers' purchasing decisions-making later. At present, we can find that the main business module of relevant e-commerce is recommendation function, based on price, quality, or scene. Such measures can be responded to most consumers, which is also known as "tip-off" at the same time, possessing most of the awareness of the demands. Therefore, in the research we figured the quantity of "tip-off reports" as a measure index of the recognition implicit demands.

3. The consciousness layer of implicit demands (CL)

At the consciousness layer, the shopping demands of consumers are in the "non-manifestation" condition, which should be discussed from the psychological level. In particular, the consciousness layer can be described as a condition in which the consumers search, browse, comment on relevant information, driven by the unsatisfied desire state of discomfort. In other words, such discomfort state can be thought as the consumers' desire to purchase goods with quality assurance, aiming to meet their psychological needs. However, such desires are not clearly expressed as specific ways or items. In social e-commerce mode, consumers' comments information in commodities interaction area is with the fitted characteristics to reflect their buying advice or empirical knowledge of communication with each other. Thus, this paper will be related "comments information" to the indicator of the consciousness layer of consumers' demands.

4. The objectivity layer of implicit demands (OL)

The objectivity layer is at the very bottom of the pyramid model of implicit demands, with the largest number of quantities, which can be regarded to be the very starting recessive demands of all other levels. To dig out the objectivity layer of consumers' demands and to manifest play a vital role in strengthening supervision power of consumers in marketing interaction, which will benefit for the enterprises in social commerce. In addition, for the enterprises, information provided in this layer is more valuable, which can be the guiding force of the enterprises to create new market demands.

Consumers' browsing behaviors on e-commerce websites are often driven by some conscious or unconscious implicit demand information, owning the objective precipitation among them. At this point, we take the "searching frequency" as the quantitative indicators of objective implicit demands.

B. Relevancy and Transferability of Implicit Demands

The "mental model" underlying consumers' behaviors of purchasing and decision-making determines inseparable relationship between its explicit and implicit demands. That is to say, the explicit and implicit demands cling to each other and stay in interrelated. In the process of consumption on the social e-commerce websites for information searching, browsing, purchasing and evaluating, and relationships between the implicit and explicit demands show a spiral progressive type of evolution.

IV. EVOLUTION MODEL ON CONSUMERS' IMPLICIT DEMANDS

A. Analysis on factors of the user classification and transformation

The purchasing behavior of consumers is a complete cycle process, which can generally be divided into five stages: purchasing demands confirming, information collecting, evaluation comparing, purchasing decisions-making and post-purchasing behaviors.

In this paper we choose the domestic mainstream guiding e-commerce platform "SMZDM.COM", established in 2010, as the object of the research, which is one of the earliest guiding platform with prices and quality oriented. The website has stimulated lots of preferential commodity information, word-of-mouth reviews and experience sharing posts.

The aim of this research is to study the evolution mechanism of the implicit demands for consumers, on the basis of the social e-commerce mode, during which the main sections involve "discovery channel", "original value guest" and other sections. By data mining, we collected information of customers who had comment records. Furthermore, based on the collected data, we measured preprocessing and cluster analysis, and after 13 clustering convergence, the results came out shown in table 1.

TABLE 1
CLUSTERING RESULTS OF USERS' BEHAVIORS IN SOCIAL COMMERCE

Class	Level	Number of "tip-offs"	Number of comments
Class 1	6	2	14
Class 2	10	21	57
Class 3	15	13	178
Class 4	7	4	39
	Number of Posts	Count	Proportion (%)
Class 1	1	1160	58%
Class 2	2	180	9%

14	Number of Sharers	SR
15	Number of Whistleblowers	BR
16	Number of Leaders	LD
17	Transferring Rate (VW to SR)	VTSR
18	Transferring Rate (SR to BR)	STBR
19	Transferring Rate (BR to LD)	BTLR
20	Rebate Income	RI
21	Daily Viewing Pages Per Person	PPD
22	Purchasing Conversion Rate	PCCR
23	Strength of Basic Improvement Input	BIS
24	Strength of Technical Improvement Input	TIS
25	Strength of Social Improvement Input	SIS
26	Strength of Personal Improvement Input	PIS
27	Increasing Rate of Viewers	VIR
28	Basic Input Strength Factors	BISF
29	Technical Input Strength Factors	TISF
30	Social Input Strength Factors	SISF
31	Personal Input Strength Factors	PISF

C. System flow chart of the model

According to the system causality diagram shown in Figure 3, we analyzed the relationship among the various influence factors, and established a system flow chart shown in Figure 4:

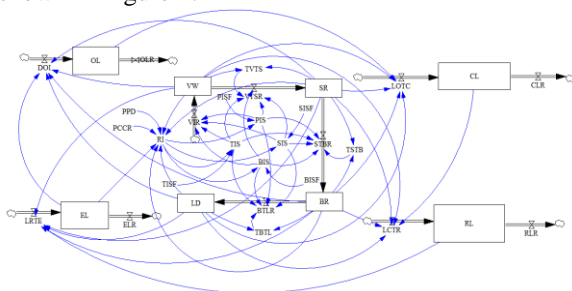


Figure 4. Flow Chart of System

The evolution mechanism of consumers' implicit demand on social e-commerce is shown in the system dynamics simulation flow chart above, including the interaction between different types of users and possible outcomes.

V. SIMULATION IN INSTANCE

We run the system simulation based on the example of "SMZDM.COM", using the relevant historical data and the prediction and estimation of the related studies. We confirm different parameters and equations in the model system established, and then tested the model test.

A. Function equations of key variables

- $VIR = DELAY1(10.79 + 2.70 * PIS + 8.18 * BIS + 9.47 * TIS + 3.18 * SIS, 1) * 10^{-3}$;
- $VTSR = DELAY1(6.48 + 2.51 * PIS + 5.13 * BIS + 6.27 * TIS + 7.41 * SIS, 1) * 10^{-3} * IF THEN ELSE(TVTS1 > 0.9, 0.8, 1)$;
- $STBR = DELAY1(2.98 + 4.26 * PIS + 1.86 * BIS + 2.93 * TIS + 5.99 * SIS, 1) * 10^{-3} * IF THEN ELSE(TSTB > 0.9, 0.8, 1)$;
- $BTLR = DELAY1(1.74 + 4.57 * PIS + 1.05 * BIS + 0.29 * TIS + 2.67 * SIS, 1) * 10^{-3} * IF THEN ELSE(TBTL > 0.9, 0.8, 1)$;
- $DOI = LN(EL) * (12.3 + 350 * SR + 300 * VW + 500 * BR + 75 * LD) * 10^{-3}$;
- $LOTC = LN(OL) * (8.32 + 39 * SR + 14 * VW + 57 * BR + 178 * LD) * 10^{-3}$;
- $LCTR = LN(CL) * (6.4 + 4 * SR + 2 * VW + 21 * BR + 13 * LD) * 10^{-3}$;
- $LRTE = LN(RL) * (7.5 + SR + VW + BR + 9 * LD) * 10^{-3}$.

The initial value:

$$VW(t) | t=0=5800; SR(t) | t=0=3100; BR(t) | t=0=900; LD(t) | t=0=200; OL(t) | t=0=200; CL(t) | t=0=200; RL(t) | t=0=200; EL(t) | t=0=200;$$

B. Model validation

The paper made an indirect measurement based on the index data of page views (PV) and 8% conversion during March to December in 2015.

We measured the effectiveness of the model using the relative error between the actual value and the simulation value. And the final simulation in instance is shown as table 3 below:

TABLE 3
Comparison of Actual Value and Simulation Value

Time (months)	Rebate income		
	Actual Value	Simulation Value	Relative Error (%)
0	1812	1600	11.700
1	2979	2672	10.305
2	4335	3892	10.219
3	5809	5232	9.933
4	7399	6672	9.86
5	9076	8203	9.619
6	10851	9821	9.484
7	12710	11522	9.347
8	14519	13307	8.348
9	16536	15175	8.231

10	18643	17129	8. 121
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Data comes from: Alexa.com

According to the simulation and comparison results listed above, covering relevant data of 10 months, we found that all of the relative errors are minor, less than 15%. Therefore, the model built in this paper has good validity and correctness so that it can be used to describe the actual system behavior.

C. System Simulation and Analysis on Key Influencing Factors

1. Simulation scheme

In order to study the evolution mechanism in which how the four impact factors of input intensity influence on the change of different types of users, we make the simulation In accordance with the schemes below:

On the basis of the original data of the model, we will adjust the four impact factors respectively (BISF, TISF, SISF, PISF) with the same assignment of 0.15, 0.35, 0.55, 0.75, 0.95, and then run the simulation.

2. System simulation

a) Simulation results with adjustment of BISF

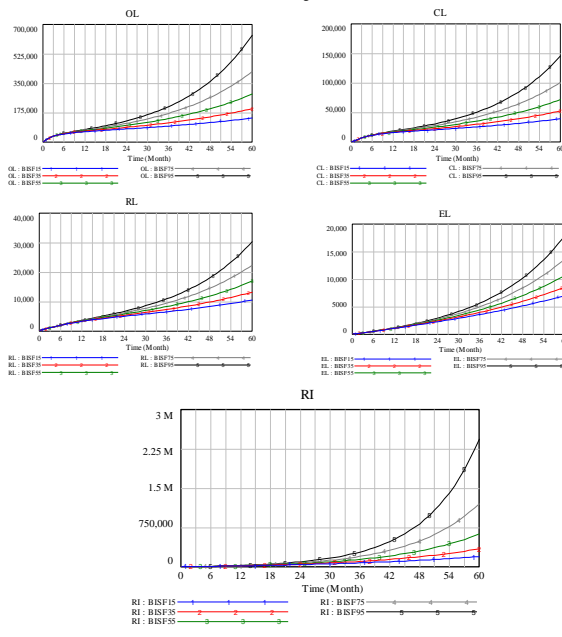


Figure 5. Results with Adjustment of BISF

b) Simulation results with adjustment of TISF

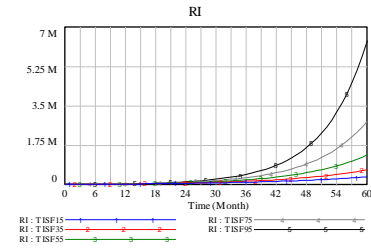
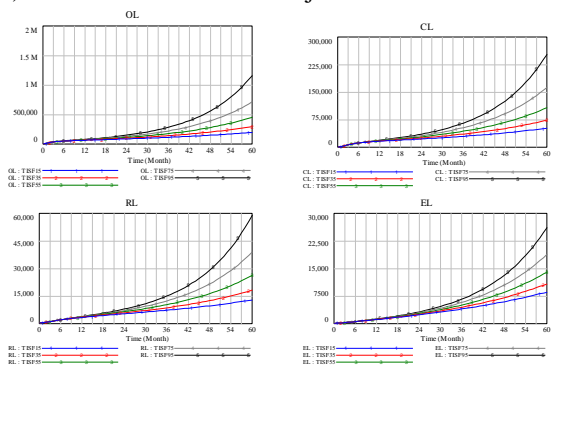


Figure 6. Results with Adjustment of TISF

c) Simulation results with adjustment of SISF

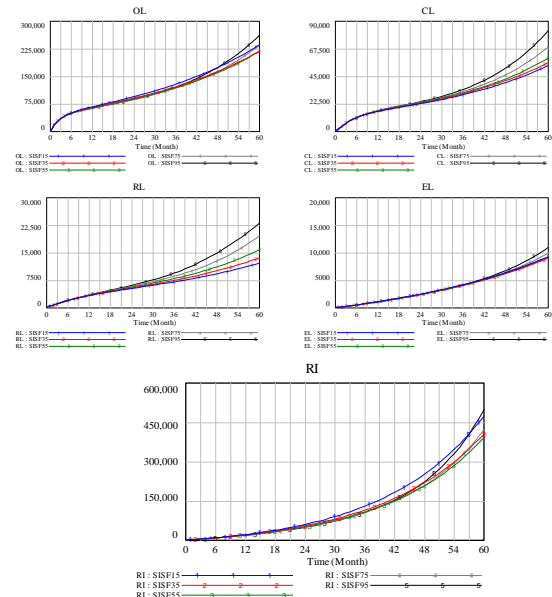


Figure 7. Results with Adjustment of SISF

d) Simulation results with adjustment of PISF

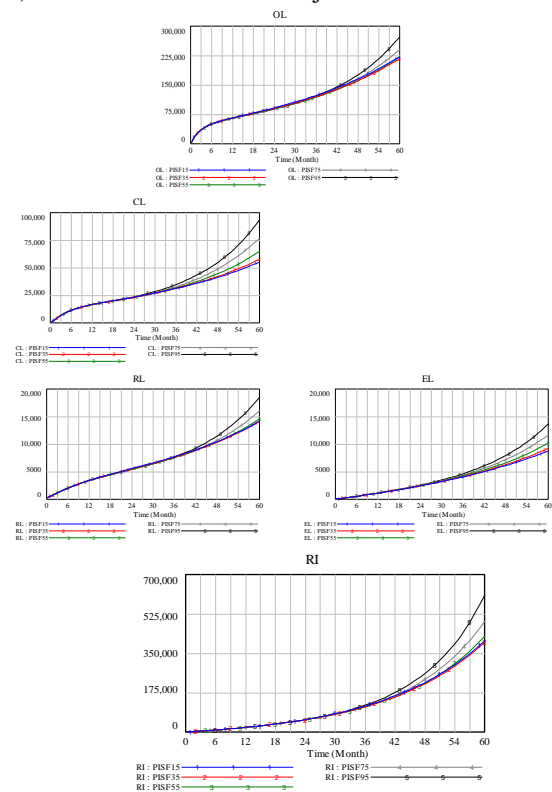


Figure 8. Results with Adjustment of PISF

A. Discussions on the Simulation Results

The above analysis shows that the influences of different factors are different, and we draw the conclusions shown below:

1. The development of the improving input and output is not synchronous, with obvious time gap. In other words, there is a fermentation period staying from the input of social commerce website to the increase of demand and improvement of performance. Therefore, managers should treat it with a long-term thinking.
2. In the current developing stage of social e-commerce, compared to the social and personal improvement input (SISF and PISF), the basic and technological input show more sensitive.
3. As the simulation progresses, users of lower level continue to shift to higher level with faster transferring speed. What's more, the growth rates of BR and LD are significantly higher than VW and SR, which can be explained as the contents of website are provided by few "leaders" and finally by all users.

B. Suggestions of Performance Improving of Social E-commerce Enterprises

On the basis of the research result, following policy recommendations are put forward:

1. As there's a process of users' identification, receive the recognition staying after websites take improving measures, managers ought realize that the increasing of the users and demand transformation is a process, which accounts for the recommendation that positive performance evaluation should be taken to rationalize the investment decision and output benefit.
2. Flexible, rational and adaptable investment portfolio strategy should be designed, rather than overly strengthen one aspect and ignore others. At present stage, managers should pay more attention to the technical construction, such as the timeliness and effectiveness, layout design of the websites, on the basis of which we should consider other aspects of the community input.
3. De-centralization system should be established to promote the further development of the social commerce. Specifically, the website can make reasonable partition of UGC, aiming to encourage lower level users

VI. CONCLUSIONS AND RECOMMENDATION

continuously advanced to a higher level by ways of contributing more content. In addition, reasonable encouraging mechanism should be designed to keep the close contact with customers.

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