

How the Corporate Social Responsibility Affects the Knowledge Sharing among Corporations: A Simulation Analysis Base on Social Network

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Abstract

Modern Information technology has greatly improved the efficiency of knowledge exchange across time and distance. However, the corporations still face many difficulties to share knowledge because of many social factors such as corporate social responsibility. In this article, a frame model is established to analyze the relationship between corporation social responsibility and knowledge sharing by middle variables leadership ability and reputation. And then, Based on social network, an evolution model of knowledge sharing is constructed to describe how the corporate social responsibility affects the knowledge sharing among corporations. The simulation results firstly confirm that there is a significant positive correlation between them. Secondly, the taking CSR actively increases the leadership ability and reputation and improve knowledge sharing. But leadership ability expands its impact by increasing social network density, while reputation expands its impact by spillover effect. This provides a new perspective to study the non-technical factors which lead to dilemma of knowledge sharing. Surely, it is also helpful for us to deeply understand how the corporate social responsibility impacts the corporate performance.

Keywords: *Corporate Social Responsibility; Knowledge Sharing; Social network; Simulation*

1. Introduction

Nowadays, the knowledge can be viewed as a kind of intangible assets with characteristics of path dependence, vague, difficult to imitate and substitute. No doubt, these characteristics make knowledge become potential and critical sources of competitive advantage. With the development of knowledge economy, especially for knowledge intensive corporations working in dynamically-competitive environments, the knowledge is becoming a kind of strategic resource. Cabrera &Cabrera (2002) pointed out that the knowledge had an interesting feature. When knowledge is shared, its value can be added. In other words, if an individual shares knowledge with other partners, they will not only access to such knowledge with a linear growth, but also they will share the knowledge with others and feedback, enlarge or modify the original knowledge. So, this process increases the value of knowledge for original provider with an exponential growth [1]. In addition, unlike standard economic transactions, knowledge can be transacted repeatedly, and the transactions do not even need to abandon the value of knowledge for each partner, i.e., non-exclusive. Thus it can create the possibility of infinite return. So, how to get enough new knowledge is an important and strategic mission for all corporations.

In dynamically-competitive environments, the innovation or knowledge creation is increasing complexly. Nahapiet &Ghoshal (1998) thought that knowledge creation was

the results of a two-way exchange process. A complete innovation was based on novel conceptual differences or new combinations of existing associated elements, but it still needed to constantly make the previously associated knowledge fragment be combined [2]. Obviously, the knowledge fragments for innovative combination come from different providers. So, knowledge sharing has become very important in the innovation process. Nonaka & Takeuchi (1995) stressed the point that knowledge sharing was very important to improve the performance of corporation. The corporation can make full use of the existing knowledge stock from different departments within the organization through knowledge sharing [3]. Therefore, a question in front of us is how to promote and facilitate the knowledge sharing among corporations effectively.

No doubt, the development of information technology plays an important role in promoting knowledge sharing. It cuts across the spatial distance and reduces the cost of knowledge exchange sharply. As Emelo (2012) had showed that it was the new norm for coworkers to be physically distant from one another. If you had an internet connection and a computer, smart phone or a tablet, you could log on and link up with the office from just about anywhere [4]. But unfortunately, corporations are facing many non-technical barriers, such as lack of sufficient understanding for the profit from knowledge sharing, lack of energy and ability to implement knowledge sharing. These all reduce their intention to participate knowledge sharing. From the perspective of decision-making and social philosophy theories, when the individual considers the decision to participate the knowledge sharing, he is confronted with a fuzzy decision-making problem due to insufficient information. Therefore, the decision makers often rely on the social relations network which is composed of various kinds of social relationships in order to making a proper decision. In other words, potential participants depend on their social relation network to learn relevant information about knowledge itself and other participants, such as the number of people who have strong relationship with decision makers to participate in knowledge sharing, and the evaluation for the experience of knowledge sharing. In addition, the social group also provides a safe environment to the individual. Furthermore, social relationship based on safety and trust improves knowledge innovation ability. Ensign & Hebert (2010) pointed out that the social network was the main feature of information exchange in twenty-first century. Specially, in research - intensive industry, the social network had been a key in boosting innovation [5]. Therefore, it is significant to study on how non-technical factors affect knowledge sharing from the social network perspective. In this article, we focus on the corporate social responsibility (abbr. CSR), corporate reputation and corporate leadership ability.

Therefore, this article is organized as follows: in section II, the knowledge sharing is treated as an index of corporate performance. The CSR is treated as antecedent variables. The corporate reputation and leadership ability are treated as middle variables. A frame model from the CSR to the knowledge sharing is constructed. In section III, based on social network, the evolution model of knowledge sharing among corporations is constructed. This model is used to describe the influence of CSR on knowledge sharing, and also used to clarify the mechanism of how CSR affects knowledge sharing efficiency. In section IV, a simulation is made to analyze the effects of CSR on knowledge sharing under different conditions. In section V, we will propose the conclusions and discussions.

2. Theory Background and Frame Model

2.1. Corporate Reputation and Knowledge Sharing

Many scholars show that a few non-technical factors such as corporate reputation have important influence on knowledge sharing. For example, Ensign & Hebert (2010) thought that the reputation was one of the key factors to promote knowledge sharing for the

personal and non-coding knowledge owned by scientists and other researchers, especially in a social network environment [5].

The reputation is a kind of intangible assets with great strategic value and can bring corporate sustained competition advantage. Especially, this competition advantage is hard to imitate. Also, the reputation can reflect the judgments on corporate from stakeholders. As we all know, having no space distance barrier seems to be the best environment for sharing information. However, Ensign & Hebert (2010) found that these scientists did not always share knowledge freely even working in the same company. On the contrary, the reputation of knowledge seekers assessed by potential knowledge providers would affect providers to decide that whether providing knowledge or not [5]. Emelo (2012) thought that, for people, the most valuable knowledge was gained through their own authentic experience. No one wanted to share something personal because of some worries, such as “*will they use it and then claim it as their own, will they give me credit for what I shared*”. In other words, it indicated that there needed trust in virtual social network. And the trust can be achieved through a reputation system [4]. Therefore, there is a positive correlation between corporate reputation and knowledge sharing.

2.2. Leadership and Knowledge Sharing

Researchers have also emphasized a strong link between leadership styles and knowledge creation. For instance, Kumar, Jain & Tiwary (2013) summarized many leadership activities which had positive impact on processes of knowledge creation including establishment of knowledge-oriented culture, knowledge creation through the process of socialization, knowledge creation through the process of combination, knowledge creation through inter-organizational collaboration and re-enforcement and expansion of knowledge-inventory [6]. However, Nonaka & Toyama (2005) thought that we still poorly understood the internal mechanism of how the leadership improved the knowledge sharing [7]. The researches have shown that one of the reasons that individuals don't want to share knowledge is to worry about the loss of personal authority power. For example, Coakes *et al.* (2008) pointed out that the individual would be reluctant to share knowledge with others if there needed to describe the level of knowledge owned by individual in the personal occupation. But leaders in organizations just helped to overcome this obstacle, because they could enhance the cooperation as well as construct the process of knowledge sharing [8]. Zaglago, Chapman & Shah (2013) stressed that the team's leaders who fostered effective identity, communication, commitment, trust and rewards among design engineers can make higher level of knowledge sharing culture [9].

Many researchers have considered the different role of leadership styles. Graen & Bien (1995) pointed out that leader-member leadership theory showed that high quality of leader-member relationship could promote the subordinates to internalize the target of group and leader, thus efficient leader-member exchange relationship may also contribute to the promotion of knowledge sharing [10]. Conger & Kanungo (1998) thought that the transformational leadership was very important for knowledge sharing, because it helped to encourage employees to share knowledge through the use of leader charisma and personal attractiveness [11]. Bryant (2003) pointed out that it helped deeply understand organization knowledge management through studying how the transformational leadership affected knowledge sharing directly or indirectly [12]. By empirical analysis based on social identity theory, Abraham, Leanne & Avi (2011) showed that relational identity promoted organizational identification. And the organizational identification had positive correlation to knowledge sharing. The results highlighted the importance of transformational leadership and leader-member conversion in promoting the identity and organizational identity. Therefore it was also conducive to knowledge sharing [13]. Liu and DeFrank (2013) had found that a focus on transformational leadership may help lessen employee's self-interests, which, in turn, leads to higher knowledge sharing intentions among work group members [14].

Based on these literatures, the author thinks that the leadership styles reflect the ability of leadership. In other words, proper or good leadership styles present that the corporation has higher level of leadership and enjoys higher prestige. Leadership ability of a corporation expands the scope of influence within its social network and increases its social capital. Furthermore, this improves the efficiency of knowledge sharing. Therefore, in this article, the author proposes that there exists a positive correlation between leadership ability and knowledge sharing.

2.3. CSR and Corporate Reputation

Many researchers also point out that there is a correlation between CSR and the corporate reputation. Stanaland, Lwin & Murphy (2011) showed that there was a positive relationship between customers' evaluation of CSR and corporate reputation [15]. Xie & Zhou (2009) pointed out that CSR would impact the corporate reputation as well as consumer purchase intention, and those corporations with good ethics image are more trustworthy [16]. Sun (2009) showed that taking CSR actively could help corporations to establish social reputation, improve customer satisfaction and loyalty, attract high-quality employees, optimize the environment of competition, and ultimately to obtain sustainable competitive advantage [17].

Also, Miron, Petcu & Sobolevski (2011) believed that CSR helped raise the companies' prestige and fame, which implicitly led to an increase in the sales, protection in times of crisis and therefore a greater competitive advantage [18]. Pour, Nazari & Emami (2014) summarized three assertions about the relationship between CSR and corporate performance. One of them is CSR activities can improve firm value by enhancement of firm reputation [19].

In addition, Jiang & Ji (2010) showed that taking CSR had a hidden reputation effect on corporate itself. Such reputation effect can change the non-cooperative game relationship between the corporate and its supplier, and then let it tend to use cooperative game axiomatic rules to deal with negotiations involved in transactions [20]. However, Fei, Li & Zhou (2010) pointed out that the cognition of public to CSR was affected by other corporations in environment. This kind of reputation effect was divided into two types. One is contagion effect, which means the consequences of CSR will be across the border and have a similar impact on other similar corporate. The other is contrast effect, which refers to an opposite impact on other similar corporate [21]. Wang, Yu & Wu (2010) constructed a relationship model about CSR, corporate reputation, corporate identity and loyalty of employee. This model revealed that the CSR be not only a direct positive effect on employee identity, but also indirect influence on corporate identity through the perception of staff to corporate reputation [22]. Zeng & Lei (2011) thought that if the corporate would have a commitment to the stakeholders for taking CSR rather than evasion. Obviously, this increased its reputation. By contrast, once the stakeholder observed its opportunistic behavior, and corporate reputation declined rapidly [23].

Maden *et al.* (2012) presented that consistent with the tenets of signaling theory, social responsibility actions of the firms acted as signal to the society and were used by different stakeholders to develop positive impressions of the firms. And diversity initiatives may enhance the firms' reputation in the eyes of the stakeholders [24]. In short, taking CSR actively is beneficial to establish a good relationship among stakeholders and can meet the social expectations. Therefore, these will help enhance corporate reputation. So, there is a positive correlation between CSR and corporate reputation.

2.4. CSR and Leadership

Strand (2011) pointed out that there existed little research which explicitly explored the intersection between leadership and CSR, and then presented major contemporary leadership theories that had been explored in relationship to CSR including

transformational leadership, transactional leadership, visionary leadership and participative leadership [25]. Du, Swaen & Lindgreen (2013) studied the roles of leadership styles in CSR and found that transactional leadership enhanced the positive relationship between institutional CSR practices and organizational outcomes, but transformational leadership diminished such relationship [26].

Different styles of leader play different roles in CSR. Good leadership will promote the implication of CSR. In other words, the level of leadership will impact the CSR. But contrast, taking CSR actively have positive impact to leadership ability of corporation through achieving social capital such as prestige, fame, much more social network ties and so on. So, there is also a positive correlation between CSR and leadership ability.

2.5. Frame Model

There are a lot of literatures about the correlation between CSR and leadership, reputation, between knowledge sharing and leadership, reputation. However, few scholars build a bridge between CSR and knowledge sharing. As Liu & Song (2010) pointed out that, the influences of CSR on corporate value creation were only discussed from the aspects of corporate reputation, image, sales and the stakeholders. It was lack of indexes and approaches which could quantify the effect of CSR. There was an urgent need to explore that how CSR affected the corporate performance (*i.e.* its “black box” process) rather than testing whether the CSR influent on corporate performance or not [27].

Because it has been proved that it will improve the corporate performance through effective knowledge sharing. So, from this thought chain, this article intends to explore how the CSR affects the knowledge sharing with middle variables corporate reputation and leadership ability. And obviously, it is also significant to understand and quantify how the CSR affect the corporate performance from the respective of knowledge sharing.

The factors which influence knowledge sharing are various and complicated. And the conductive process from CSR to knowledge sharing is also very complex. So, it is important to clarify the relationship among these variables. Because this will help us to deeply understand the specific role and process of CSR on knowledge sharing. Also, it will help to break the internal mechanism of CSR on corporate value creation and corporate performance.

Now, we can deduce the following important conclusions from above literature preview.

(i) There is a positive correlation between CSR and corporate reputation. That is, the better the corporate fulfill the CSR, the better its social reputation. Otherwise it will be lower.

(ii) There is also a positive correlation between CSR and corporate leadership ability.

(iii) There is a positive correlation between corporate reputation and knowledge sharing.

(iv) There is a positive correlation between corporate leadership ability and knowledge sharing.

(v) There is a positive correlation between corporate performance and knowledge sharing.

Therefore, we get a simple frame model of CSR against knowledge sharing and corporate performance as shown in Figure 1.

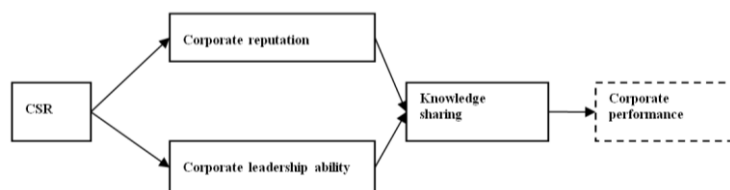


Figure 1. Frame Model of CSR on Knowledge Sharing

3. An Evolution Model of Knowledge Sharing Process

Assume that the number of corporations in social network is N , each corporation represents a node. And the relationship between two corporations represents an edge. The weight of each edge represents the degree of mutual contacts and exchanges. They form an undirected graph as $G(E, V)$, $V = \{1, 2, \dots, N\}$, $E = \{e_i, i \in V\}$. If the node corporation i and j have a certain social relationship such as cooperation, we let the path length equal to 1. That is $d(i, j) = 1$ which indicates that the two nodes are indirectly adjacent. Otherwise, they are indirectly adjacent, that is $d(i, j) = 0$.

In this paper, we argue that these corporations are heterogeneous because of their different culture and management status. Considering the stability of social cooperation, the relationship of each corporation and its associated partners remains unchanged in a certain period of time. In other words, the number of edges which each node has is not the same but remains unchanged. We use randomly generated function to achieve them. For the purpose of the study, this paper does not consider the external factors such as national policy, mainly considering the influence of CSR, social reputation and leadership ability on the efficiency of knowledge sharing. As we have showed in above analysis, whether the corporations are willing to participate in knowledge sharing is a fuzzy decision-making problem. Well, according to the theories of bandwagons, if income is vague, then the information that who joined the sharing of knowledge rather than knowledge itself will produce bandwagons pressure. This leads to more potential corporations to join knowledge sharing. Especially in China, the group consciousness is very strong in the "face" cultural background, it will be more obvious when individual intention is influenced by pressure of groups. It can also be thought that each corporation has a threshold under the social pressure. If exceeding the threshold, the corporation will join the knowledge sharing. Otherwise it would refuse to take part in.

Therefore, we construct a pressure threshold function model as follow

$$p_i^t = \sum_j^m s_{ij}^t W_{ij}^t \quad j \in \Phi_i \tag{1}$$

p_{ij}^t represents the pressure from inner group to node i at time t . And m represents the number of nodes who has direct relation with node i at time t . The assemblage $\Phi_i = \{k \mid d(i, k) = 1, k \neq i\}$ represents all nodes which have direct connection with node i .

s_j^t represents the attitude to participate the knowledge sharing for node j at time t . whether the corporate j is willing to share knowledge depends on the comparison of the bandwagons pressure and its maximum pressure which it can withstand. So, we get

$$s_j^t = \begin{cases} 1 & p_j^t > p_j^{\max} \\ 0 & p_j^t \leq p_j^{\max} \end{cases} \quad j \in \Phi_i$$

Where $s_j^t = 1$ represents corporation j is willing to take part in knowledge sharing. By contrast, $s_j^t = 0$ represents corporation j is not willing to take part in knowledge sharing.

p_j^t represents the influence from group for corporate j at time t . p_j^{\max} represents the maximum pressure taken by corporate j which also represents a threshold value. $s_j^t W_{ij}^t$ indicates that it will make effective bandwagons pressure only if the node j has taken part in knowledge sharing. W^t represents influence degree matrix at time t . W_{ij}^t represents the

influence degree of node j to i at time t , which shows the level of communicating and interacting between them. And such influence degree is affected by corporate reputation and leadership ability. So we get

$$W^t = (\alpha R^t(CSR) + (1 - \alpha)L^t(CSR))W^0 \quad (2)$$

For corporate i , we get

$$W_{ij}^t = (\alpha R_j^t(CSR) + (1 - \alpha)L_j^t(CSR))W_{ij}^0 \quad j \in \Phi_i \quad (3)$$

R^t represents the value of corporate reputation at time t . L^t represents the value of corporate leadership ability. From above analysis, we know that the increasing of W^t will be strictly lead by the increasing of R^t , so that W^t can be viewed as a monotonically increasing function of R^t . Similarly, W^t is also a monotonically increasing function of L^t . α is a preference coefficient which shows that influence degree is much more affected by corporate social reputation or corporate leadership ability.

Because of the correlation between CSR and reputation, leadership ability, well, we need to know what are the functions $R_j^t(CSR)$ and $L_j^t(CSR)$. In order to quantify these variables, utility theory is considered.

We use interval number (0, 1) and (-1, 1) to represent the level of taking CSR and corporate reputation respectively. The number 0 represents that the corporation has never taken CSR and then it receives the most negative evaluation marked with number -1. By contrast, the number 1 represents that it has taken all CSR and then it receives the most positive evaluation marked with number 1. Especially, there is not a liner correlation between them. Considering the utility decreasing, we suppose that they have the correlation as Figure 2.

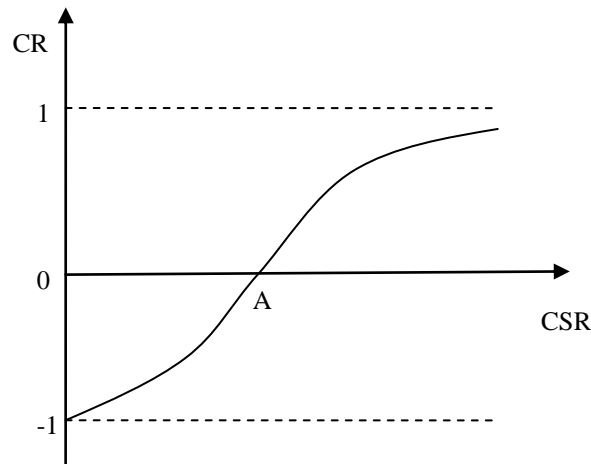


Figure 2. Correlation between CR and CSR

Where, CR is the corporate reputation.

So, we get $R^t(CSR) = 1 - e^{\beta - CSR}$. Because, when the CSR equals to 0, the CR equals to -1, so, $\beta = \ln 2$.

Similarly, we suppose that there is the correlation between CSR and corporate leadership ability as Figure 3.

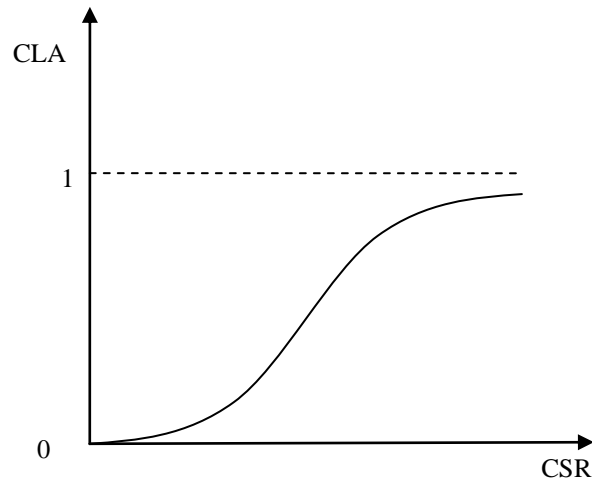


Figure 3. Correlation between CLA and CSR

Where, CLA is the corporate leadership ability.

So, we get $L^t(CSR) = 1 - e^{-CSR}$

To sum up, we can get the final threshold model as follow

$$p_i^t = \sum_{j=1}^m s_j^t (1 - (1 + \alpha)e^{-CSR}) W_{ij}^0$$

$$i = 1, 2, \dots, N \quad j \in \Phi_i \quad (4)$$

In this paper, we think that the efficiency of knowledge sharing can be described from two dimensions. One is the extent of knowledge sharing named by E^t , which refers to the intensity of knowledge sharing at time t. It equals to the numbers of corporations which have taken part in knowledge sharing at time t in whole network. The other is conduction velocity of knowledge sharing named by V^t , which refers to the spreading velocity of knowledge sharing action among potential participants. It equals to the numbers of corporations to participate in knowledge sharing with per unit time.

So, we can get the following formulas

$$E^t = \sum_i^N S_i^t \quad V^t = E^t/t \quad (5)$$

4. Simulation and analysis

4.1. Setting of Basic Parameters and Instructions

Assume that the number of nodes N is 400, and each node is named by 1 to 400 respectively. Because these corporations are heterogeneous, the numbers of the edges for each node is not the same. So is the influence degree between different corporations. Therefore, we can make the connection matrix V by random function. The initial influence degree matrix W^0 is generated by a uniformly distributed random function in the interval (0, 1). The zero means no influence, and the greater the number is, the greater the influence degree is.

If we only consider the influence of CSR on knowledge sharing by leadership ability, we let $\alpha = 0$. By contrast, we let $\alpha = 1$. In addition, we assume the node 1 be the initiator of knowledge sharing behavior or the knowledge provider. In Figure 4 and Figure 5, the

horizontal axis represents a discrete time process named by T , and the vertical axis represents the extent of knowledge sharing, i.e. E^t . According to the formula (5), the slope of that curve can be expressed by knowledge sharing speed, i.e. V^t .

4.2. CSR- Leadership Ability- Knowledge Sharing

In this section, we mainly analyze that how the increasing CSR affects knowledge sharing by the intermediate variable leadership ability. In the network of social relations, characteristic of each node is different. That is to say each node has different characteristic, and the network structure will be changed along with the change of nodes. The social comparison theory shows that different network structures of social communication will affect the potential participants to access to the information about knowledge sharing. Therefore, it will influence the behavior of knowledge sharing. So, we think that, with the increasing of taking CSR for initiator, i.e. node 1, its leadership ability will also increase gradually. This will make it receive much more social capitals. From the perspective of network structure, the linked hierarchically level from node 1 to other associated nodes will expand. In other words, some nodes which have no directly connection with node 1 before will link directly with node 1 because of its increasing influence. For example, if a corporation gets special awards from government because of its taking CSR actively, its leadership ability will obviously improve. So, some corporations which do not associate with it in the past may come to negotiate business.

Suppose that such level expands to the second layer, so we let

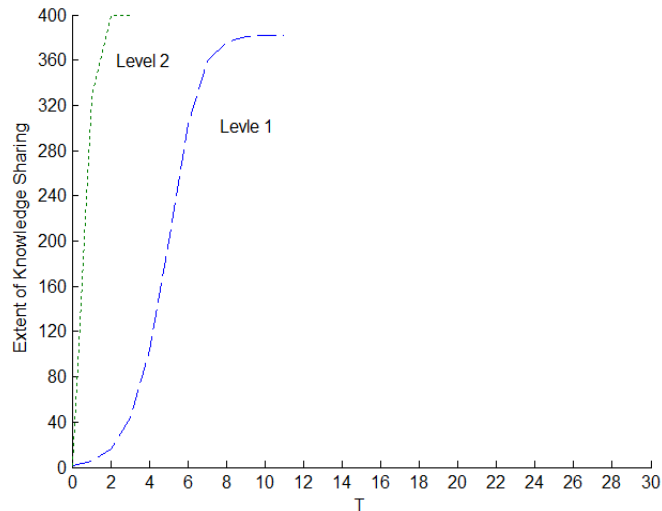
$$d(1, i) = 1, i \in \{j / d(1, j) = 2\}$$

The calculation results are shown in Fig.4. The Level1 shows that the CSR of node 1 keep the same and the level of conduction is 1. The Level2 shows that the CSR of node 1 increase and the level of conduction also increase to the second layer. From subfig.4-1 to 4-3, they show that the enhancement of CSR will influence on the sharing willingness of

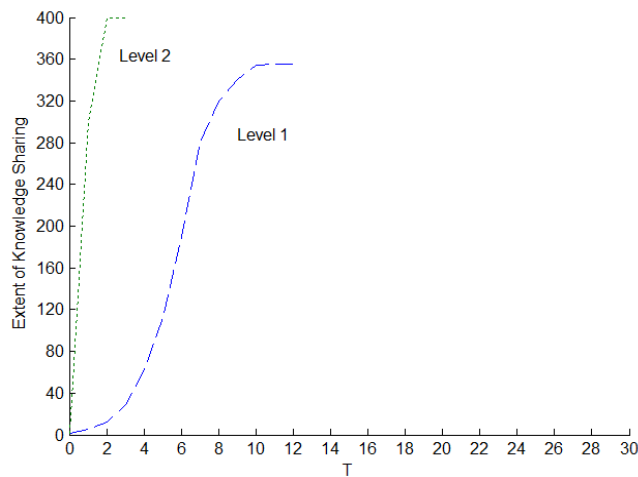
potential participants with the increasing of group pressure threshold P_j^{\max} .

Firstly, it can be seen from subfigure 4-1 that the enhancement of CSR of the initiator can significantly accelerate the speed to participate in knowledge sharing at a certain pressure threshold conditions (i.e. slope of the curve Level2 is more steep). In addition, it can also improve the extent of knowledge sharing. In the case of Level2, all 400 companies have joined the knowledge sharing, and in the case of Level1, the number of participants did not reach 400.

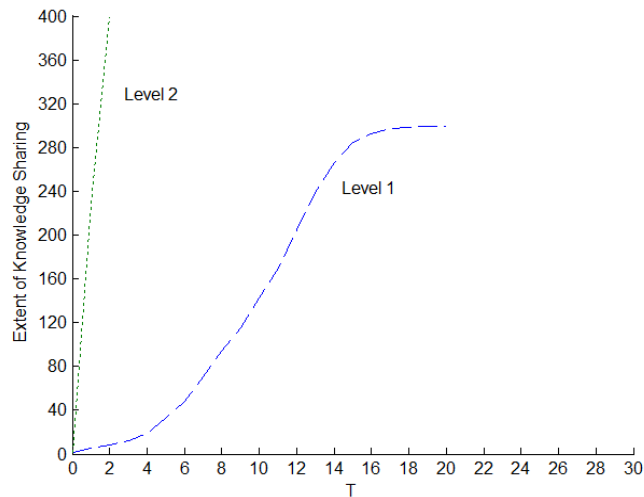
The subfigure 4-2 and 4-3 show the change of knowledge sharing efficiency with the increase of group pressure threshold P_j^{\max} . By comparison, we find that, with the increase of group pressure threshold, the intention of taking part in knowledge sharing will weaken, and then the speed and extent of knowledge sharing significantly slow down, as the curve with Level11 shown. Furthermore, increasing pressure threshold much more, the efficiency gap between Level2 and Level1 is gradually expanding much more than that of general situation. This is caused by increasing leadership ability of node 1 with the increasing of its CSR. And simulation results show that this is similar with "star effect". Due to the characteristics of knowledge, it is a vague problem to judge the benefits for participating in knowledge sharing. So, whether the corporations are willing to take risk is largely depended on the cognition to partners. The enhancement of the knowledge provider's CSR will let the other participants build more confidence and trust, so as to facilitate knowledge sharing. It indicates that taking CSR actively will be helpful to knowledge sharing among corporations.



Subfigure 4-1



Subfigure 4-2



Subfigure 4-3

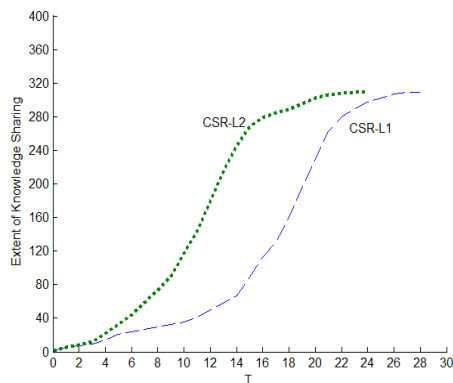
**Figure 4. Impact of CSR on Knowledge Sharing by Leadership Ability
based on Different p_j^{\max}**

4.3. CSR-corporate Reputation- knowledge Sharing

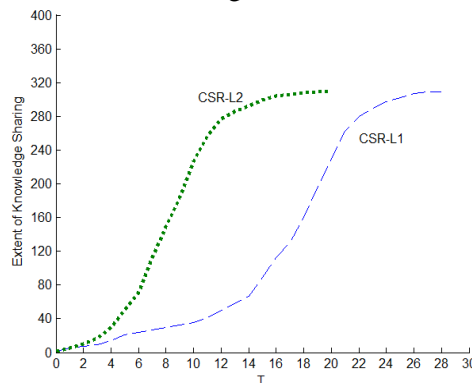
In this section, we mainly analyze the impact of CSR on knowledge sharing by corporate reputation based on contagion effect. We must take into account fact that the potential participants would build a knowledge alliance. Moreover, it tends to be bound together for good or ill. Therefore, we only consider the contagion effect rather than contrast effect. The contagion effect means that the consequences of CSR are across corporations' boundaries and have a similar impact on other associated corporations. So, we assume that the reputation of corporations which directly link to knowledge provider will also increase or decrease with the change of initiator's CSR.

The knowledge sharing states are shown in Figure 5. The CSR-L1 means that the corporation keeps CSR the same and there will be no contagion effect of reputation. While the CSR-L2 means that there will be contagion effect of reputation with the change of knowledge provider's CSR. The subfig.5-1 is the initial reference state. As shown from the plots, the speed and extent of knowledge sharing of CSR-L2 both raise much more than CSR-L1 with the increasing of CSR.

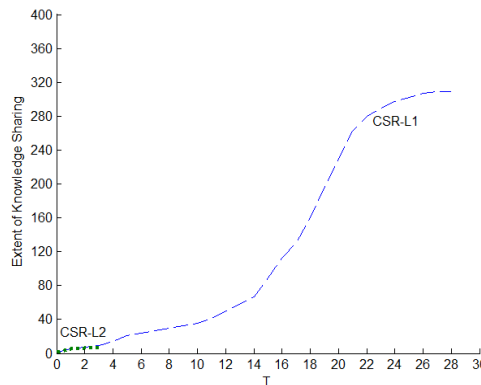
The subfigure 5-2 means that we increase the CSR on the basis of subfigure 5-1. Comparing these two figures, the gap between CSR-L1 and CSR-L2 is expanded. Similarly, in subfigure 5-3, we decrease the CSR on the subfigure 5-1, and then we find that the efficiency of knowledge sharing CSR-L2 is quite lower. The process of knowledge sharing stops just for a short time. How to explain these results? One side, it shows that there is a significant positive correlation between CSR and knowledge sharing. Another side, the reputation's contagion effect of CSR shows that the consequences of CSR may have externality and the contagion effect will further increase or decrease such externality. Through a positive commitment to social responsibility, the corporate will obtain positive feedback and support from potential partners, and at the same time, these partners can also obtain the recessive income. Instead, the poor performance on CSR may lead to the boycott of partners.



Subfigure 5-1



Subfigure 5-2



Subfigure 5-3

Figure 5. Impact of CSR on Knowledge Sharing by Reputation based on Contagion Effect

Why is it difficult for corporations to share knowledge? A key factor is that it is very hard to establish the absolute trust between the corporations and is unable to restrain speculation. Under this circumstance, taking CSR for knowledge provider will improve its reputation and enhance the trust of other participants to it. Because of the infectious effect, these tend to love the tree and love the branch. Obviously, these potential participants will also be trust more on the first participants who have directly links with provider. And then through continuous transmission, more potential participants are encouraged to participate in knowledge sharing. So, the extent and speed of knowledge sharing will become much more and faster.

5. Discussions and Conclusions

Innovation, dissemination, sharing and exchange of knowledge increase additional income for corporations through the recycling process of "production - sharing - using-adding value -reproduction-sharing -". So, How to promote knowledge sharing among corporations has become an important issue in knowledge management. The development of information technology promotes knowledge sharing greatly, but many non-technical factors still restrict the efficiency of knowledge sharing. A key factor is trust, but how to build better trust among corporations? In most literatures, corporate leadership and reputation are paid much more attentions. With the development of CSR, there are closed correlation between CSR and leadership and reputation. However, there is a gap between CSR and knowledge sharing.

In this paper, we try to clarify the whole conductive process that how the CSR affects the efficiency of knowledge sharing through middle variables, i.e. corporate leadership and reputation. The simulation results confirm that the CSR will indirectly affect the knowledge sharing efficiency through leadership ability and reputation. There is a significant positive correlation between them. Furthermore, there is a different conductive mechanism on knowledge sharing between leadership ability and reputation. Firstly, taking CSR actively will increase the leadership ability of knowledge provider. And then, it makes the knowledge provider permeate its impact into much further in social network. In other words, it only affects those nodes linked directly with it before. But now, it can affects those nodes linked indirectly with it, for instance, $d(i,j)=2$ or 3 and so on. In short, its network density becomes much higher. According to social capital theory, its social capital increases much more and obviously improves the knowledge sharing efficiency. Secondly, taking CSR actively will increase the corporate reputation of knowledge provider. However, because of contagion effect, the reputation of other nodes linked directly with knowledge provider also increases. In practice, due to lack of information, potential participators of knowledge sharing cannot judge their directly partners. If their

partners just are the provider's partners, these potential participators tend to take part in knowledge sharing. Because they think the provider has good reputation due to taking CSR actively, obviously the provider's partners also has good reputation. This is so called "love the tree, love the branch".

An interesting work for further is that if the CSR of potential participators rather than the knowledge providers, what are the results? Maybe, many complex conditions are also considered.

At last, All these provide a new perspective to understand the "black box" of how CSR influent corporate performance as well as break the non-technology barriers of knowledge sharing.

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