Analysis on the Functions and Effectiveness of Reputation Mechanism in Alliance Cooperation

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Abstract. This paper explores first the prisoner's dilemma facing the dynamic alliances in the process of trust establishment with reference to the analytical method of game theory and then examines the function mechanism, application conditions, and existing deficiencies involved in system guarantee, reputation and emotion mechanisms related to the process. The result shows that efforts have to be further exerted on perfecting the legal system, strengthening reputation mechanism, and fostering emotion mechanism so as to alter the situation of prisoner's dilemma.

Introduction

The alliance is a new form of organizational structure of enterprises aiming at timely seizing market opportunities, sharing resources, and reducing risks [1]. The provisionality and dynamism accompanying with cooperative relationship of dynamic alliance bring about a quick reaction capability while at the same time create great difficulty when establishing mutual trust. In other words, the situation of prisoner's dilemma makes building mutual trust a tough nut for dynamic appliance to crack.[2]

In the fields of society, economy, law, and organizational relationship, the significance of mutual trust has been widely acknowledged by more and more people. (illustrated in Luhmann,1979; B. Barber, 1983; Fukuyama,1995; Zhang Weiyiing, 2002; Garbarino & Johnson 1999; Mayer et al., 1995; McAllister, 1995; Morgan & Hunt, 1994; Perry & Mankin, 2004; Powell, 1990; Burt & Knez,1995; Blomqvist & Stahle, 2000; Roxanne Zolin, 2004)[3,8,9]. Trust is rated as the core feature of alliance cooperation relationship during the process of dynamic alliance construction[2]. Anderson & Narus (1990) points out the output of alliance enterprises on account of joint effort will exceed the output which solely relies on the incentive of obtaining maximum interest once mutual trust has been established [4]. It is the lack of mutual trust inside the alliance that has itself to blame for most of unsuccessful alliance cooperation [5, 6, 7]. In view of the vital role trust plays in forming and organizing dynamic alliance, the problem about how to establish valid trust mechanism needs to be addressed to help the enterprises not only to break through the prisoner's dilemma and build harmonious environment beneficial to mutual trust, but also to increase flexibility of dynamic alliance in responses to market opportunities and reduce transaction costs.

The prisoner's dilemma facing the dynamic alliances in the process of trust establishment is explored in the second section with reference to the analytical method of game theory. In the third section, the function mechanism, application conditions, and existing deficiencies involved in system guarantee, reputation and emotion mechanisms related to the process are individually analyzed. Summary is made in the last section based on previous analysis results, revealing the conclusion that efforts have to be further exerted on perfecting the legal system, strengthening reputation mechanism, and fostering emotion mechanism so as to alter the situation of prisoner's dilemma.

Prisoner’s Dilemma Facing the Establishment of Trust Relationship in Dynamic Alliances

Firstly, incompleteness of the system itself. Adequate evidences about this issue can be sought out
in view of transaction cost theory and contract theory. Under circumstances of bounded rationality and nondeterminacy, many future events are unpredictable when legislating or signing contracts, making it quite difficult to develop very complete regulations, systems, or contracts. Beyond doubt, incomplete systems apparently lack power to exert all-around constraints on the members of dynamic alliance.

Secondly, difficulty in trust evaluation. The complexity of transaction behaviors and relations between enterprises also makes it a tough work to clearly define whether or not a certain enterprise possesses credibility. Just because of this, there’s great limitation of evidence collection, and of course, laws cannot function well in punishing deceptive parties or guaranteeing the benefits of trustworthy parties.

Thirdly, costly supervision and implementation expenditure. It costs a lot to supervise and evaluate each other’s behaviors whether it is done by alliance enterprises themselves or resorting to some qualified third parties. Even though Pareto optimality can be achieved through supervision, the ultimate transaction profits and efficiency will still be negatively affected due to the increase of intermediate costs.

Fourthly, it even creates possibility for the enterprises to manipulate systems to engage in opportunistic behaviors. The incomplete systems and hard-to-realize authentication by the third party increase chances for alliance members to utilize systems as useful tools to implement opportunistic behaviors. If long-term transactions between alliances are maintained by add-on clauses, the alliance enterprises probably will blame each other for violating agreements, attempting to punish the other side and grab those lucrative roles for itself by manipulating systems. (Telser 1980)

For establishment of trust in alliance enterprises, refining and developing just legal systems, regulations and measures, security systems, and formidable law enforcement capacity can contribute a lot to system guarantee. However, due to obstacles like difficulty of producing evidence that are critical in safeguarding system implementation, merely resorting to exterior system governance is an approach which brings nothing but high cost and low efficiency, as contracts themselves are far from enough to maintain long-term trust, and legal mechanism is not designed to solve all the problems. Thereby other contractual as well as non-contractual forms need to be brought in as supplements.

**Trust Establishment Mechanism in Light of Reputation Effects**

Reputation mechanism derives from repeated game. Provided long-term cooperation of alliance and the situation of multiple repeated game, the alliance members tend to care more about long-term cooperation profits instead of one-shot benefit in short-term speculation. However, in the situation of finitely repeated game, Nash equilibrium solution embodies in a chain of (perfidy, perfidy), (perfidy, perfidy)……, and once more, in infinitely repeated game, another equilibrium should also be taken into consideration. As Figure 1 about payment structure shows, both parties will adhere to trust if each party starts from the point of trust and stick it out; another case is that one of them will reversely choose perfidy forever once the other side’s perfidy is detected. When assuming a big enough discount factor $\delta = 1/(1+r)$ ($r$ here represents level of interest rate), both parties will have more patient sense of time, relatively considerable profits are expected to be made after the discount. If one party of the dynamic alliance chooses perfidy at $t$ in a certain period which results in $T$ on one’s own side and $S$ on the other, the other side will definitely choose long-term perfidy in return regardless of its self-interest. Thus the party who first implements perfidy has no alternatives but continue the position of perfidy, too. The benefit gained will be: $T + 0 + 0 + \ldots = T$

While the loss is: $R + R\delta + R\delta^2 + \ldots = R(1 + \delta + \delta^2 + \ldots) = R/(1-\delta)$

The first letter $R$ refers to the benefit that theoretically can be obtained from trust cooperation, $R\delta$ refers to the benefit during $t+1$ period after the discount. Apparently, when and only when $R/(1-\delta)>T$, that is, $\delta>1-R/T$, no single party will choose perfidy. Therefore, in situation of $\delta>1-R/T$, both master 1 and master 2 of the alliance tend to cooperate with trustful attitude when each of them
adopts *grim strategy*, making \{trust, trust\} the Nash equilibrium point, and Pareto optimality is realized. Furthermore, given big enough discount factor, two masters will not focus on short-term gains and act opportunistically, but highly value the future benefits whilst building mutual trust to achieve long-term collaboration.

The previous analysis, however, also reflects the dynamic nature of alliance, endowing cooperation with *provisionality*. That being the case, is reputation mechanism still valid? If so, what conditions need to be satisfied to make reputation mechanism function well?

We hold the opinion that the interaction as well as interdependence between alliance members are not completely over although cooperative relationship of dynamic alliance may come to an end with the completion of specific projects; once new projects emerge, alliance members will become each other’s *cooperative object library*, thereby the cooperation between those members manifests itself as *intermittence* featured by *recurrence* rather than *one-shot game*.

In addition, in the entire network system, each alliance group corresponds to respective node in the network which gathers and disperses with varying market opportunities, and reputation can exert forces of connecting various nodes. Enterprises with good reputation are more attractive for the other side and facilitate easier alliance and more cooperative opportunities between them, resulting in increased profits and even stronger groups. Similarly, the groups with negative reputation generate repulsive force which prompts other groups to depart with them due to reluctance of cooperation, leading to a gradual loss of opportunities of obtaining more benefits, and at last are kicked out of the fierce competition.

It is precisely because of the context of social relationship networks that the cooperative relationship of dynamic alliance demonstrates *dynamic continuity*. All parties involved in the network hope to keep their own reputation so as to lay solid foundation for each group’s survival and development. Therefore, reputation mechanism is still valid in the process of *trust* establishment of dynamic alliance, and in construction of dynamic alliance, it plays altogether three vital roles: (1) information transfer function. It helps enhance trust degree of alliance members with positive reputation and creates more cooperative opportunities. (2) function of sanctions. Negative reputation itself can be used as sanction mechanism to punish dishonest behaviors, which helps all the alliance members to attach importance to credibility. (3) function of trust transfer. Groups who possess good reputation can transfer others’ trust on the trustees to the third parties. Specifically speaking, even if a certain third party has not any direct or indirect relationship with the enterprise or group, the two alliance groups contact each other indirectly via the third party who possesses authorized reputation. This kind of indirect contacts can play an active role in both information passage and substitution, making it an effective mechanism to keep off opportunistic behaviors.

Then in the process of trust establishment of dynamic alliance, what conditions need to be satisfied to facilitate reputation mechanism to come into play?

The above analysis shows that the establishment of reputation must satisfy the in equation \(\delta > 1 - R/T\), that is, building reputation depends on formidable enough punishment, the nature of which is to promote long-term costs for deceptive behaviors. For instance, if master 1 is deceived by master 2, master 1 will by no means cooperate with master 2 next time, and at the same time other alliance members will also in no way trust master 2 and collaborate with them due to their negative reputation, leaving master 2 the problem of long-term loss caused by ruined enterprise reputation. For this reason, the corresponding alliance members will actively take measures to establish and safeguard their enterprise reputation because of their unwillingness to lose future cooperative opportunities and suffer even greater loss. The Nash equilibrium of *one-shot* game is mutual distrust, whereas in repeated game, the equilibrium is mutual trust on the premise of formidable enough punishment or high enough opportunity cost for deceptive acts. Nevertheless, the following points are still required to satisfy this condition:

In the first place, a sound market environment needs to be created. Because the alliance subjects are faced with a variety of uncertain factors and unforeseeable and non-transparent market environment, they are likely to suffer from weakened trust caused by short-sighted anticipation especially when the subjects are unable to predict what will happen in the future. For instance, in
the economic environment featured by high inflation, dynamic alliance members will find it hard to keep faith in long-term cooperation. Therefore, a sound complete system of market economy lays the foundation for building up adequate confidence about future economy among alliance members, for motivating long-term reputation accumulation of their own, and for guaranteeing effective cooperation. To sum up, creating sound market environment and providing long-term expectation for each alliance subject can enable them to survive and develop in a transparent and foreseeable environment, which is labeled as a safeguard policy for building up social reputation mechanism.

In the second place, efficient information organization and communicative system should be realized and available inside and outside of dynamic alliances. Informationization promotes the developments of network organizations, one of its manifestations is amplifying and intensifying function embodied in incentive effect of reputation. This makes it feasible for both parties of dynamic alliance to learn more about each other and for the third parties to play the supervision role, which is beneficial for developing a steady cooperative relationship between alliance members.

The next requirement is about the construction of a complete reputation evaluation system. Information containing reputation factors may be inaccurate or distorted. It will encounter misinterpretation while reputation is transmitted along a long chain. In order to prohibit alliances’ breach of trust, credit record system for both enterprises and individuals and objective reputation evaluation should step in as the key to solving this problem. This can also help dynamic alliances be aware of the fact: In a broad sense, besides direct trading cooperative network, the whole economic society is a cooperative network which is so closely connected with them that the behaviors of dynamic alliances are restrained and the enterprise members are motivated to value their own reputation accumulation.

In the end, reputation establishment should be combined with clear property rights definition as well as system guarantee. Clarifying property rights definition can make alliance subjects the takers or beneficiaries of benefits from the practice of constructing reputation mechanism; Reasonable system guarantee, meanwhile, can motivate the honest subjects and punish those who fail to keep a faithful line. Only in this way can the alliance subjects find their internal drive and enthusiasm in reputation establishment.

References