Distribution Mechanism of International Oil and Gas Project Stakeholders Based on Game Model

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Abstract
According to the role of various stakeholders on international oil and gas project, proposed the classification about stakeholders from the view of political, economic and social, which can be divided into government, investors and the residents of project location. According to the overbalance distribution of stakeholder's interests, establish the tripartite game model, it often happens that the pairwise joint together in the game process so the analysis of game mainly in the view of each stakeholder and finally puts forward the optimal strategies of profit allocation.
Key words: INTERNATIONAL OIL AND GAS PROJECT, GAME THEORY, STAKEHOLDER

1. Introduction

International oil and gas project construction can bring additional benefits to all stakeholders, but it must be accompanied by the interest game of the stakeholders. According to the groups of the economic interests and activities that participate in the international oil and gas projects, we can divide the stakeholders into three parts, including the government, the project investors and the residents of project location. The government mainly include the project host country governments and the relevant examination and approval authority, the project investors are the main participants of the international oil gas project construction process, which includes both shareholders, joint venture company, bank , contractors, sub manufacturers, suppliers and other service units that service for the overseas engineering project construction directly or indirectly; residents of the project location including the project staff and located residents nearby.

The inhabitants of the project location has the duty to protect local resources, the process of international oil gas project construction is closely related with the located land, environment, ecology. The economic activity of the project will lead to the corresponding negative externality of environmental and ecological problems [1]. Therefore, the residents of the project location should share the right of distribution of interests.

Project investors are the executors of the international oil and gas project construction, who are engaged in a series of economic activities related to the international oil and gas projects, in order to achieve the purpose of maximizing interests. They are the direct implementation of international oil and gas project construction and the direct beneficiaries of the development of resources and also the main objects of conflict in the process of international oil and gas project construction.

The government is the key party to determine whether or not the international oil and gas engineering project can be carried out, which need the approval of the relevant authority before implementation. By using the resource of the host country, the government should get the corresponding interests in international oil and gas project construction.

2. Basic concepts

Currently there is less research on international oil and gas project stakeholders, for example, according to the research of crude oil pipeline between Kazakhstan and China. Li Zhiqiang pointed out that the advantages and disadvantages of equal rights management and balance mechanism that the stakeholder participate in the internal governance structure [2].

International oil and gas project has the following characteristics:

Great technical difficulties. International projects must be strictly in accordance with the international standards and norms for the development and construction, to protect the host country's economy, the government will set up all kinds of barriers, especially technical barriers to reduce competitor's entering, which has greatly increased the difficulties of technical controlling.

Strong political. Petroleum is the lifeline of the national economy and have a far-reaching impact on international and domestic politics which lead to the oil and gas projects with a strong political. International political situation and the political environment also has a direct impact on project.

High risk. International oil and gas project is a high risk investment projects. "High Risks with High Income". There are many uncertain and uncontrollable factors in the process of management, such as resource risk, market risk, financial risk, social risk, natural risk, economic risk and political risk and so on, so it's difficult to achieve the professional goal, time limited goal and cost goal. The greater uncertainty, the higher risk [3].

3. Research on the three party game model

3.1 Game behavior analysis

Yong W et.al. analyzed rent-seeking behavior of three main participants in international engineering project [4]. In the international oil and gas project construction, the benefits target of government, investors, and the residents of project location are not consistent. In the game of the three party, there is often a combination of two parties [5], in which the government and the investors union are the most common. At the same time, there are also the joint of the project investors and

the residents of the project location, as well as the joint of the residents and the government of the project location. Because of the inconsistency of the benefits target, it usually lead to contradictions and conflicts.

3.2 Constructing game model

The main stakeholders of the international oil and gas project construction are the government, the project investors and the local residents. On the basis of the distribution of the interests of the local residents and the project investor, establishing the tripartite Game Model of stakeholders [6]-[8].

Project investors (T_i) can divide the operating conditions into good case (t_1) and bad case (t_2). In the node 1, the project investors distribute the benefits according to their own operating conditions. If the project investors distribute the interests in accordance with the standard ratio (M), then the game is

over, write for outcome SQ; otherwise, the project investors will choose the strategy (L), which distribute the interests according to less than standard ratio. Among them, set of strategies of the investors is , and under the condition of normal distribution, project investors can obtain a utility gains, government can get e and local residents can get g.

In the node 2, according to the L strategy of project investors, the local residents can choose to accept (A) or not accept (NA) strategy. If local residents choose to accept, the game ends, write for outcome NA; otherwise, the local residents don't accept and put forward demands to the project investors. Among them, set of strategies of the local residents is project investors can obtain b utility gains, government can get f and local residents can get d, and b>a ,e>f, g>d .
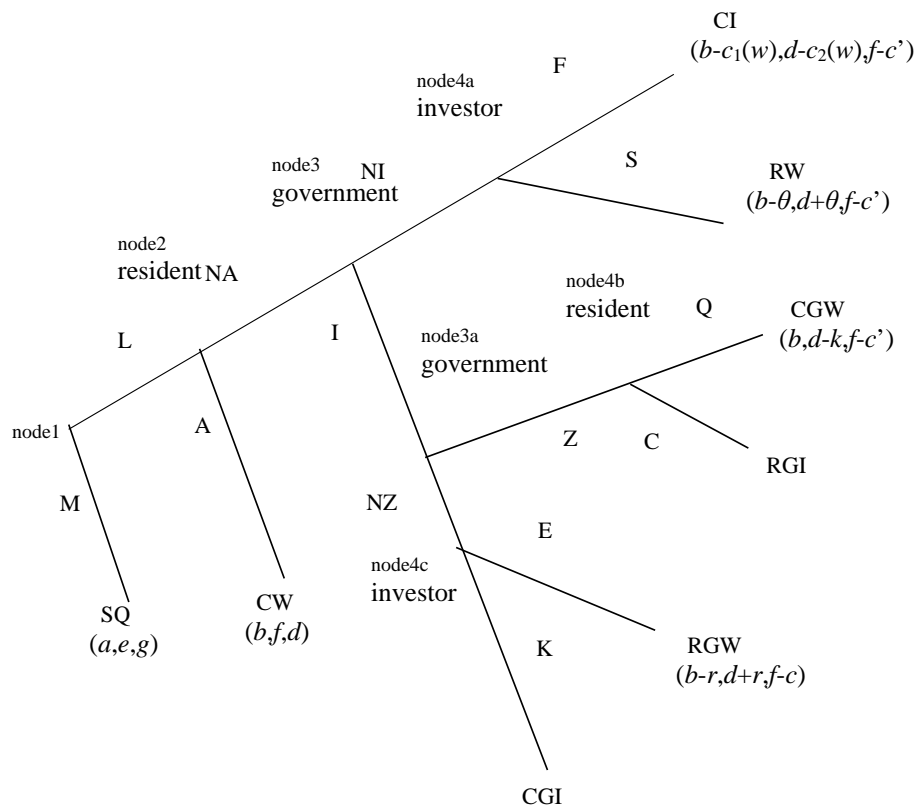

Figure 1. International oil and gas project construction of tripartite interest-subjects game model

At the node 3, on the condition of the local residents do not accept the items the government will take intervention (I) or not take intervention (NI) two strategies, the government's intervention strategy can be divided into

intervention to the project investors (NZ)and to the local residents (Z). In the node 4c, project investors have two strategies ,one is meeting the requirements of the government and improving allocation strategy (E) and the other one is to

maintain the original distribution (K), write for the outcome of meeting the government requirements is RGW, otherwise the result is CGI; When the government suppress the local residents to prevent conflicts with the project investors, in the node 4b, the local residents also have two strategies, one is to continue conflicts with the investors (C) the other one is stopping (Q), when the local residents choose Q strategy, write down CGW, otherwise RGI. When the government do not take intervene, local residents, in the node 4a, project investors still have two strategies ,one is meeting the local resident's demands (S) the other one is clashed with the local residents (F). When the project investors satisfy the demands of local residents, write down RW, otherwise CI. Among them, set of strategies of the government is .When project investors choose L strategy, the costs of the local government take intervention to deal with the conflicts between local residents and the investors is c'; the benefits of the government strive for the local residents is r; the negative utility that the government intervention may lead to is k; and without government intervention, the negative utility is c*;When Project investors have conflict with local residents, the local residents would be acceptable to increase the minimum demands for θ, and b -a >θ, otherwise the project investors will choose M strategy; The costs for each party that the conflicts between local residents and the investors has caused are c1(t) and c2(t).

In the game model, project investors have a clearly mind about their operating conditions, but the local residents only know the probability distribution of p (t1) and p (t2).When the project investors choose L strategy, the faith that the local residents believe that the operating situation for good is .Assuming that the probability of governmental intervention is p (I); and under the intervention strategy, the probability of Z strategy is p (G). In the game, project investors, local residents and the government can get the total utility of UC, UR and UG. Therefore, under the different situations, the three parties can get benefits as shown in Figure 1

4. Game model to solve

At the node 4c, regardless of its management is good or bad, project investors tend to RGW. Because the government will help the residents to ask for compensations to investors and hope the residents can get their reasonable interests [9]. So if the project investor maintain the original compensation strategy unchanged, they would have clashed with the government, which will suffer a greater loss to project investors. Therefore, project investors usually do not choose clashed with the government, but tend to RGW ending. So, $URCGW > URRGI$.

In the node 4b, the residents are more inclined to choose CGW rather than RGI. In the construction of international oil and gas project, residents were in a weak position. So even if the protests were suppressed by the government, they usually don't choose clashed with the government, because the result of the conflict will not bring any benefit to them.

Therefore, $URCGW > URRGI$.
In the node 4a, project investor have a tendency of RW and CI in different degrees. On the condition of good operating, the project investors tend to choose to meet the minimum demands of residents of the project location or the conflicts will lead to great loss; under the condition of bad operating, project investors are more likely to choose clashed with residents of the project location.

From the perspective of government, whether government take intervention strategy depends on the operating conditions of project investors. Local residents choice NA while the project investor take strategy L, if the government make intervention, the expected revenue is , or . When there is no difference about whether the government make intervention or not, there is .

From the perspective of the residents of the project location, the local residents whether choose to accept the existing allocation or not depend on the operating conditions. When investors choose L strategy, the local residents choose A strategy and the expected revenue is D, if the government make intervention, the residents will choose NA and the expected revenue is .When there is no difference about expectations whether the residents accept or not, there is ; If without intervention ,the residents choose NA and the expected revenue is , at this point, there is no difference about expectations whether the residents accept or not, there is .

From the perspective of project investors, under the condition of certain local residents and certain government policies, investors will choose the strategy than can maximize their expected interests. That is to say, meeting the condition, project investors can get the optimal payment policy.

Therefore, the equilibrium strategies combination is:

(1) when $p(I) > p*(I), p(G) > p*(G)$, $m*(t_i) \equiv L, a*(L) = A, v = I, p \in \forall$

(2) when $p(I) > p*(I), p(G) < p*(G)$,

If $b - a < r(1 - p(G))$, then

$m*(t_i) \equiv M, a*(L) = NA, v = I, p \in \forall$;

If $b - a > r(1 - p(G))$, then

$m*(t_i) \equiv L, a*(L) = NA, v = I, p \in \forall$.

(3)when $p(I) < p*(I), p < p*$,

$m*(t_i) \equiv L, a*(L) = A, v = NA$.

(4) when $p(I) < p*(I), p > p*$,

If $b - a > c_1(t_1)$, then $m*(t_i) \equiv L$,

$a*(L) = NA, v = NI$;

If $b - a < c_1(t_2)$, then $\begin{cases} L, t_i = t_1 \\ M, t_i = t_2 \end{cases}$, $a*(L) = NA, v = NI$.

5. Game model analysis

As for the government, the government's strategy selections are connected with the strategy choice of the project investors and the inhabitants of the project location. From the game model we can find that the government get the expected revenue is the largest when project investors choose *M* strategy. According to the model assumption, the government take actions usually after the conflicts have emerged between the government and the residents. The government can intervene to make the project investors choose *M* strategy. When the interests of residents is more than the project investor's interests of information distortion, that is to say project investors will choose M strategies. In the game, b-a is affirmator, $p(G)$ is determined for the government, therefore, project investors will choose *M* strategies when r is bigger and the government can strive for more benefits for the residents.

For the residents of the project location, the residents of the project location strategy choice on the one hand influenced by government behavior, on the other hand the strategy choice is connected with the stand or fall of management state of the project investors. When residents believe that the government would strive for more benefit for them, they will choose *NA* strategy, or choose *A*. when residents think that the largest probability of the investor carry out L strategy and well operating the project is , residents can accept the interests distribution ratio, otherwise they will choose clashed with project investors. P * was positively proportional relationship with c2 (t_2) and inversely proportional to θ. When c2 (t_2) is smaller, the greater the θ, the probability is smaller, which residents believe investors carry out L strategy is a worse decision and residents are willing to accept the existing allocation. And when the project investors and local residents in conflict, the costs is greater than the interests of the information distortion, project investors will

choose M strategy. At this point, the government and the residents of the project location can get their due interests.

As for the project investors, the larger expected interest strategy is L, when the government maintenance projects probability at least not less than project investors expected revenue maximum. p (G) and r were positively proportional relationship, and k in inverse proportion, When r is much greater and k is much smaller, the size of the numerical of r and k, reflects the role of the government. the stronger the government power, and the government tend to protect the interests of the residents, in order to avoid conflict with the government, project investors will choose to meet the requirements of the government; When the government unit the investor ,most projects local residents will choose to accept the terms. Investors carry out L strategy, various stakeholders will suffer great loss when conflict were happened. If investor accept M strategy, the stakeholders will get their benefits, which is the best strategy choice and conforms to the social development. Project investors, therefore, should be carried out in accordance with the standard ratio for the residents of the project location distribution of interests, in order to achieve the goal of tripartite interests balance.

6. Conclusion

By analyzing the game among the government, investors and the residents of project location under the condition of uneven profits distribution ,we found that the residents of project located in a vulnerable position, when the government decide to make more profits for the residents, project investors tend to avoid conflicts with the government, so they will meet the relevant demands of residents; When the government combined with the investors, residents usually keep silence because of lacking for discourse Rights; But in the process of international oil and gas project construction, the optimal strategy is that all stakeholders can get proper and reasonable interests, therefore, project investors need to distribute the profits according to the standard ratio to the residents of the project location, only in this way can they achieve tripartite benefit equilibrium. The significance of this paper is that by introducing the game theory into the international oil and gas engineering project management, providing a solution when interests are inequality.

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