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One Belt and One Road Overcapacity Risk and Solution Suggestions

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Abstract: This paper studies the phenomenon of "back empty car" in the process of "New Europe" railway transportation, reflecting the excess capacity risk under the "Belt and Road" strategy. With the increase of the number of logistics and transportation parties in the international logistics transportation market, through the analysis and derivation of the negotiation efficiency conversion model, the growth trend of negotiation effectiveness under the two negotiation modes is compared, and the characteristics of the Belt and Road transportation capacity are analyzed and verified. Negotiating the ability to convert efficiency as one of the ways to solve the risk of excess capacity in the Belt and Road; By designing a compensation structure that motivates short-term interests and long-term interests, it encourages the ability of the international supply guarantee talents to negotiate the ability to switch; Its core value lies in solving the risk of excess capacity in the Belt and Road. It has a high practical significance.
Keywords: Belt and Road overcapacity Negotiation efficiency Compensation structure.

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1. INTRODUCTION

Excess capacity is one of the significant risks of overcapacity in China. Capacity exceeding demand is a common phenomenon in economic operation. A certain degree of excess can promote the development of market economy and create an incentive atmosphere for survival of the fittest among enterprises [1]. However, overcapacity will bring a lot of negative impacts on economic operations, which will directly lead to a decline in product prices, a decline in industry profits, and a large number of losses or even closures [2]. Overcapacity not only affects the profits of enterprises in the industry and the employment of workers, but also greatly damages the allocation of resources and the ecological environment, which in turn affects the sustainable and healthy development of the entire national economy [3]. Since the reform and opening up, the problem of overcapacity has been plaguing the Chinese economy. The policy department has paid close attention to this and has made overcapacity a priority. The overcapacity problem has seriously hindered the long-term development of China's economy. So how to deal with overcapacity is particularly critical. In this paper, the paper analyzes and

studies the excess capacity of the Belt and Road infrastructure contained in the capacity problem.

2. THEORETICAL BASIS AND ASSUMPTIONS

In order to study the problem of excess capacity of the Belt and Road, we describe the system as a competitive cooperation game consisting of the original capacity provider, the customer, and the new capacity provider. In the special scenario, the status quo allows the speciality of the capacity provider. Therefore, after the new capacity of the Belt and Road is built and operated, there are generally three situations:

Situation 1: Supply and demand complementarity. The new capacity immediately compensates for the needs of local customers and creates a natural cooperative relationship, that is, the game scenario between the new capacity party and the local customer. The purpose of the game is to transform the isolated status quo into a cooperative alliance. Promoting a cooperative alliance in this particular scenario also requires effective negotiation capabilities.

Situation 2: The situation of alliance changes. The new capacity provider provides the source of the competition for the current capacity provider, and the customer is the status quo partner of the original capacity provider. The purpose of f1 is to maintain the customer, improve the competitiveness, improve the negotiation ability and the customer to leave the transaction cost. The purpose of f2 is to improve the negotiation ability. And to increase the value of the service to promote the transformation of the cooperative alliance; the purpose of f2 in the game is to achieve the goal game. However, this article assumes that f1 is a multi-service provider that already exists in the local area and does not have full merging operability.

Situation 3: The alliance is stable. The new capacity provider strives to maintain the alliance that has been achieved and has maintained a stable customer relationship. In this game, the role of f2 is the same as that of the original capacity provider, that is, efforts to improve competitiveness, negotiation ability, and transaction costs of leaving the alliance; the purpose of f2 in this game is to maintain the target game, or to promote part of the competitive f1 merge into the f2.

Situation 2 is used as the focus game to study its game feature function and reason related propositions.

3. SYSTEM SPECIFICATION

In the three-party game of the original capacity provider f1, customer b, and new capacity provider f2 under the alliance transition scenario, f2 has achieved the goal of changing the alliance status, and f1 aims to maintain the status quo of the alliance, and the customer realizes the value and state transition by balancing its alliance. Cost, make alliance choices.

The two organizational forms that define the negotiating power in the negotiation power conversion model are as follows:

Serial bargaining: The negotiating team led by an experienced negotiating manager is responsible for the entire process of the transaction negotiation;

Parallel bargaining: A trading team consisting of multiple people, each responsible for only part of the transaction negotiation process;

The former is more expensive than the latter, but the efficiency of the negotiation is better than the latter. Because local knowledge, influence, and social networks are indispensable components of the negotiating capacity of international transport operators, they can generally be assumed to be scarce resources that are not commonly owned by all negotiators. α_j indicates the ability of the above two forms of negotiation efficiency transformation, $j = \{s, p\}$, s stands for serial negotiation, p stands for Parallel negotiation. $t_s > t_p > 0$, $1 \geq \alpha_s \geq \alpha_p \geq 0$.

3.1 Model 1

Because the model involves more variables, so sort out a variable comparison table 1 as follows:

Table 1. Variable description

variable	description
$j \in \{s, p\}$	Organizational form: serial bargaining; parallel bargaining
$F = \{f_1, f_2\}$	f_1:Original capacity provider, f_2:New capacity provider
b	customer
c	Customer's value perception of capacity service
$v^j\{T\}$	Value Characteristics in Negotiation Game
u_j	Negotiation efficiency
S_j	Capacity saturation
α_j	Negotiation utility conversion capability
θ_1	outside option of the original capacity provider
θ_2	outside option of the New capacity provider
t_j	Alliance change conversion cost
k	Additional cost

Since $\{f_1, b\}$ f_2 is the status quo alliance, f2 is the new capacity surplus party entering the market, and the external selection of f2 is less than the existing external selection of f1, $\theta_2 < \theta_1$. If in the eyes of the supplier, the evaluation value of the new capacity party is greater than the evaluation value of the current capacity party, the supplier will choose to leave the current supply service provider to achieve the target game, $c_2 > c_1$. At this time, the sum of the value

distribution between the two logistics service providers and the supplier is in the $[c_1+\theta_2, c_2+\theta_1]$ interval, and the value distribution is:

$$v^j\{f_1, f_2, b\} = v_N^j = [c_1+\theta_2, c_2+\theta_1], \quad v^j\{f_1, b\} = c_1, \quad v^j\{f_2, b\} = c_2,$$

$$v^j\{f_1\} = \theta_1, \quad v^j\{f_2\} = \theta_2, \quad v^j\{b\} = 0$$

According to the above value distribution characteristics, the marginal product is the difference between the sum of the three parties and the value of the current alliance:

$$\max\left(v^j\{f_1, f_2, b\}\right) - v^j\{f_1, b\}$$
$$\Rightarrow mp_{f_2} = c_2 + \theta_1 - c_1$$

The value range of f2 is between the value of its individual production and the value of the marginal product it produces, $[\theta_2, c_2+\theta_1-c_1]$, which is called the "nuclear" in the new alliance game. The power function diagram of the new capacity provider is shown in Figure 2.

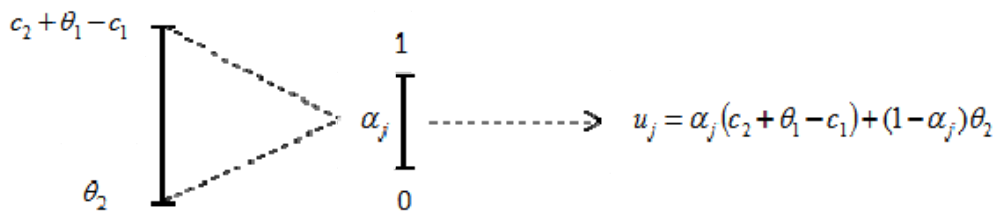

Figure 2. Power function diagram of the new capacity provider

According to the definition of negotiation utility:

$$\begin{aligned} u_{f_2} &= \alpha_j(c_2+\theta_1-c_1)+(1-\alpha_j)\theta_2 \\ &= \alpha_j(c_2+\theta_1-c_1-\theta_2)+\theta_2 \\ &= \alpha_j(c_2-c_1)+\alpha_j(\theta_1-\theta_2)+\theta_2 \end{aligned}$$

Proposition 1.From the status quo to the target game, the necessary conditions for the transition; $c_2 - c_1 > t_j > 0$

Proof.

By definition, the actual value of the two logistics service providers in the eyes of suppliers is $v^j\{f_1, b\} = c_1$ and $v^j\{f_2, b\} = c_2 - t_j$ respectively. If the value of f2 is greater than the value of f1 in the supplier's eyes, the supplier will choose to leave the current capacity provider.

$$v^j\{f_2,b\} > v^j\{f_1,b\}$$
$$\Rightarrow c_2 - t_j > c_1$$
$$\Rightarrow c_2 - c_1 > t_j > 0$$

Proposition 2.From the status quo to the target game, Capacity saturation increases as f2 outside option increases; $\partial S / \partial \theta_2 > 0$

Proof. By the chain rule,

$$\frac{\partial S}{\partial \theta_2} = \frac{\partial S}{\partial u_{f_2}} \cdot \frac{\partial u_{f_2}}{\partial \theta_2}, \frac{\partial S}{\partial u_{f_2}} > 0, \frac{\partial u_{f_2}}{\partial \theta_2} = 1 - \alpha_j > 0$$

Proposition 3.From the status quo to the target game, the outside option of f2 is less sensitive to efficient tissue forms than the sensitivity of general tissue forms; $\frac{\partial S_s}{\partial \theta_2} < \frac{\partial S_p}{\partial \theta_2}$

Proof.

$$mp_{f_2} = c_2 + \theta_1 - c_1$$
$$\Rightarrow u_{f_2} = \alpha_j(c_2 - c_1 + \theta_1) + (1-\alpha_j)\theta_2$$
$$\Rightarrow \frac{\partial u_{f_2}}{\partial \theta_2} = 1 - \alpha_j$$
$$\Rightarrow \frac{\partial u_s^{f_2}}{\partial \theta_2} < \frac{\partial u_p^{f_2}}{\partial \theta_2} \Rightarrow \frac{\partial S_s}{\partial \theta_2} < \frac{\partial S_p}{\partial \theta_2}$$

Proposition 4.When f2 adopts a sequential negotiation organization form, capacity saturation is more sensitive to negotiation ability; $\partial S_s / \partial \alpha > \partial S_p / \partial \alpha$

Proof.

Assume that $\frac{S_s}{u_{f_2}} > \frac{S_p}{u_{f_2}} > 0$, and

$$\frac{\partial S_j}{\partial \alpha} = \frac{\partial S_j}{\partial u_{f_2}} \cdot \frac{\partial u_{f_2}}{\partial \alpha} = \frac{\partial S_j}{\partial u_{f_2}}(c_2 - c_1 + \theta_1 - \theta_2)$$
$$\Rightarrow \frac{\partial S_s}{\partial \alpha} > \frac{\partial S_p}{\partial \alpha}$$

3.2 Model 2

Elements of negotiating ability that are indispensable for new capacity providers:

Local knowledge and experience, including accurate understanding of local social rules, organizational culture, accurate communication, coordination and understanding, and understanding of each other; also includes sensitivity and coping ability to local uncertainties;

Local resource elements, including local social influence, active social networks, market resources (customer resources), etc.;

Traders (negotiators) with (1) and (2) negotiation capability elements are suitable as executive managers to organize trading teams in serial bargaining mode; at the same time, assistant trade negotiators are the target of growth training.

Based on existing resources, it will be effective in a short period of time without compromising the long-term interests of the Belt and Road logistics service providers. That is, the incentives are quick and effective, preventing short-sighted behavior.

Suppose a company hires an international supply security talent. The amount of resources that the security talent has is S.Such resources can be tangible or intangible, and are an average resource. The probability that it is judged by the enterprise as a certain talent type is μ, Its outside option is u ,And regardless of the ability to enforce talent, the company will motivate its efforts.

The company divides the hiring time into four stages: T_1, T_2, T_3, T_4, Each stage has a duration of 1 year.If the international supply guarantee talents can see significant results at this stage after the end of the first phase, the projects in the subsequent stages can be smoothly carried out. At this point, the company determines that this talent is highly capable μ_1 .If no significant results are achieved during this period, the company will investigate the lag period of the international supply guarantee talent for one year. If the talent passes the observation of the lag period in the second stage, the project can be carried out in the subsequent stage. The enterprise determines that this talent is a person with high lag performance μ_2 .On the other hand, if the lag period fails, the company and the talent will terminate the employment contract. At this time, the company determines that the talent is a low-achieving ability $1-\mu_1-\mu_1'-\mu_2$ .If this talent is at the end of the first phase, the company can see significant results at this stage. When he successfully goes to the subsequent stage of the project, the company finds that this talent has behaviors that undermine the long-term interests of the project, the enterprise determines that this talent is a pseudo-high ability μ_1' .The ability to execute projects is far less than those with high implementation capabilities.

The international supply guarantee talent decision-making process is shown in Figure 1.

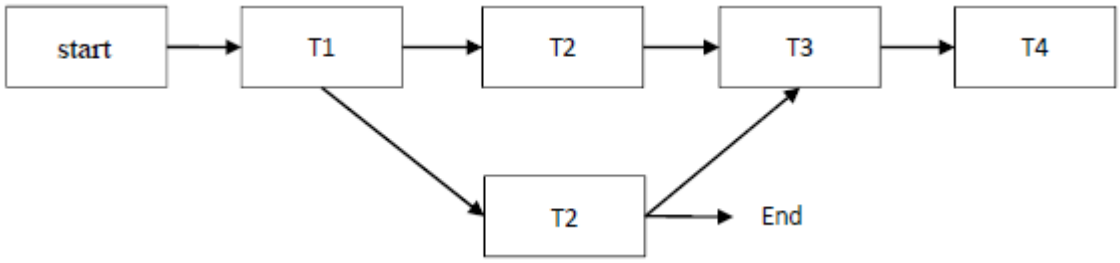

Fig 1. International Supply Guarantee Talent Decision Process Diagram

Assume that the talents are working hard to implement, If ρ is the return on the return of the successful execution of talents, χ is the probability that the event itself may be affected by the unprotected talent decision, α is the incremental factor that guarantees the success of the talent during the execution of the project, when the talent employed by the enterprise is When the person with high achievement ability, the person with high pseudo-realization ability or the person with high lag ability, the probability of success in executing the decision will increase to a certain extent. After the first three stages of project execution have seen significant results, the pseudo-high-achievement ability shows the probability of damaging long-term benefits in the final stage, and regardless of the type of protection talent, if the effort cost is 0, the salary settlement profit is 0.

Table 4. International Supply Guarantee Talents Executive Income Statement

Professional type	stage	profit	Probability
High achiever(μ_1)	T_1	ρS	$\chi+\alpha$
	T_2-T_4	$3\rho S$	$\chi+\alpha$
Pseudo-high ability(μ_1')	T_1-T_3	$3\rho S$	$\chi+\alpha$
	T_4	ρS	η
High hysteresis ability(μ_2)	T_1	ρS	χ
	T_2	ρS	$\chi+\alpha$
	T_3-T_4	$2\rho S$	$\chi+\alpha$
Low achiever($1-\mu_1-\mu_1'-\mu_2$)	T_1	ρS	χ
	T_2	ρS	χ

Assume that a logistics company's salary for international supply security personnel consists of four parts: fixed salary, first year performance award, year-end performance award and long-term performance award. The fixed salary is paid by the enterprises at each stage, and has nothing to do with the performance of the guaranteed talents; the first year performance award is that the company expects the international supply guarantee to use its resources as soon as possible to maximize efficiency. In the first stage of the incentive bonus, the year-end performance award is the bonus paid by the enterprise to the talent in the second to fourth stages. In order to be more motivating in the initial stage of the project, the year-end performance award must be to meet the conditions:

$$b_1 > b \geq 0$$

The long-term performance award is based on the delayed payment of professional talent performance. This part of the bonus will only be paid in the stage when the professional completes all stages and succeeds. The international supply guarantee talents will subjectively combine with the market status to generate the current market discount rate, and obtain a discount rate $r > 0$.

Therefore, at the end of the project payment, the actual value of the international supply guarantee talents for the delayed payment of bonuses is $\frac{v}{(1+r)}$.

It can be seen from the above conditions that the expected profit of the high-achieving ability in the second to fourth stages is the same as the expected profit of the pseudo-high-achieving ability in the first to third stages, but in the fourth stage, the pseudo- Those who achieve high ability will damage the long-term interests of the company, and the profits he brings are less than the expected benefits under normal circumstances. In order for the company to perceive that the person will harm the long-term benefits, the conditions must be met:

$$\eta < \chi - \alpha$$

Proposition 5. In order to prevent the international supply guarantee talents from damaging the long-term interests of enterprises, under the above-mentioned conditions, when enterprises are faced with the choice of two types of talents: the ability to achieve pseudo-high ability and the ability to achieve high lag, the enterprise will choose talents with high lag ability. Type, the necessary relationship between the instant payment bonus and the delayed payment bonus;

$$b_1 \cdot \frac{\alpha}{\chi + \alpha - \eta} - b < \frac{v}{(1+r)^4}$$

Proof.

The remuneration available to those with high achieveability is known from the previous assumptions and Table 4, and the sum of the fixed remuneration portion and the possible bonuses is:

$$W_{\mu_1} = 4f + b_1(\chi + \alpha) + 3b(\chi + \alpha) + (\chi + \alpha)\frac{v}{(1+r)^4}$$

The sum of the salaries that may be obtained by the pseudo-high achiever is:

$$W_{\mu_1'} = 4f + b_1(\chi + \alpha) + 2b(\chi + \alpha) + b \cdot \eta + \eta \cdot \frac{v}{(1+\mathrm{r})^4}$$

The sum of the compensation that may be obtained by those with high lag performance is:

$$W_{\mu_2} = 4f + b_1\chi + 3b(\chi + \alpha) + (\chi + \alpha)\frac{v}{(1+r)^4}$$

The sum of the salaries that may be obtained by those with low ability is:

$$W_{1-\mu_1-\mu_1'-\mu_2} = 2f + b_1\chi + b\chi$$

On the basis of the problems of lag or damage to the long-term interests of the company in all stages of project execution, the performance of the compensation for those with high lag performance is higher than that for those with high pseudo-realization ability. So there is the following reasoning:

$$4f + b_1(\chi+\alpha) + 2b(\chi+\alpha) + b\cdot\eta + \eta\cdot\frac{v}{(1+\mathrm{r})^4} < 4f + b_1\chi + 3b(\chi+\alpha) + (\chi+\alpha)\frac{v}{(1+r)^4}$$

$$\Rightarrow b_1\alpha + b\cdot\eta < b(\chi+\alpha) + (\chi+\alpha-\eta)\frac{v}{(1+r)^4}$$

$$\Rightarrow b_1\alpha - b(\chi+\alpha-\eta) < (\chi+\alpha-\eta)\frac{v}{(1+r)^4}$$

$$\Rightarrow b_1\frac{\alpha}{\chi+\alpha-\eta} - b < \frac{v}{(1+r)^4}$$

The conditions are proven.

4. CONCLUSION AND SOLUTION SUGGESTIONS

When the Belt and Road transport provider enters the new market environment, the capacity effect is generally not fully realized in time, that is, the situation 1 in the negotiation power conversion model is not a general reality; Under the premise of the establishment of Proposition 1, Propositions 2, 3, and 4 respectively prove that the construction of sequential negotiation capability is a sensitive factor for the new capacity provider to improve the saturation of capacity; The effectiveness of negotiating ability requires a reasonable salary structure for incentives and guarantees; In order to motivate quick results, prevent short-sighted behavior, and achieve utility in a short period of time based on existing resources, without compromising the long-term interests of the Belt and Road transport providers, the first year year-end award, his year-end award, and long-term performance award. A reasonable structural relationship should be met.

In short, the long-term effectiveness of the Belt and Road capacity needs to build effective negotiation skills and salary incentive structures that you want to match.

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