

# Analysis on the Decision-Making Model of Private Sector Companies in PPP Projects

Xueqin Shan\*, Chuanming Wu, Wenhua Hou, and Xiaosu Ye

**Abstract**—Successful public-private-partnership (PPP) implementation can not be achieved without the active participation of private sector companies. This paper examines the decision-making of private sector companies in public works delivered by the PPP model on the basis of social responsibility theory. It proposes that private sector companies should identify objectives of entering into PPP projects, and shoulder relevant social responsibilities, while a minimum return should also be guaranteed in their favor, so as to compensate for their assumed risk and support them to take on responsibilities in the future. The paper also gives a calculation regarding the appropriate scale and reasonable degree of private sector involvement in PPP projects through the cost-benefit analysis in a specific case study, with the purpose to guide the private sector companies to create a cooperation environment resembling “symbiosis” and facilitate the smooth implementation of public works delivered by the PPP model.

**Keywords**—Social Responsibility Theory, Cost-benefit Analysis, PPP Projects, Private Sector Companies, Decision-making Model

## I. INTRODUCTION

INCREASING urbanization in recent years has created greater demand for public works in China. Due to relatively tight financial budget and inadequateness of quality assurance on the part of public sectors, private sector companies are increasingly welcomed as the participators in public works, for their participation can help address the problems of insufficient construction funds and relatively low efficiency, while the projects can also provide ideal channels of investments for those private investors which harbor huge reserves of capital and strong desire to invest. The PPP model, with the feature of “shared risk and profits”, is proved to be an effective way to attract private sector capital investment in public works, with successful application in some international practices, yet it is a relatively late introduction to China with few practical cases, thus serious problems are met during the implementation of some

PPP projects, and some projects even fail, which results in considerable uncertainties for private sector companies with regard to the economic impact of participating in PPP projects[1]. Wang Shuhao and Wang Zhuofu argue that the application of the PPP model in China is not mature enough in many aspects, as there are many problems in the assessment and approval procedure, risk allocation and continuity during contract implementation for private sector involvement[2]. Liu Jianying and Li Shengjie hold that private investors assume risk too large for them in current model of public-private-partnership, and some risk that should be taken on by the governments is transferred to private investors, the problems of which are big concerns for profit-driven private sector companies, thus threatening the enthusiasm of private sector companies’ participation in PPP projects[3]. In fact, the majority of PPP projects are large-scale public works related to national welfare and the people’s livelihood, with high levels of externality, in which social and environmental benefits are highlighted. Private sector companies need to assume more social responsibilities in public works, compared with their participation in ordinary construction projects, while taking on social accountabilities has currently become an important factor in improving their competitiveness. Yet the basic prerequisite for companies, as microcosmic entities of market economy, to survive is acquiring profit. If private sector companies think that the participation in the PPP projects will lead to a decrease in their profits and go against the long-term development, then there is little hope of their active participation in the PPP projects. Therefore, in order to guide private sector companies to make rational and scientific decisions towards the participation of PPP projects and to facilitate smooth implementation of public works delivered by the PPP model, it is of huge theoretical significance to demonstrate in theory the relation between private sector involvement in PPP projects and social responsibilities to be taken on during the participation, as it can illustrate the positive impact on the sustainability of their development, while it is of huge practical significance to understand in real cases the features of the cost and benefits in private sector participation and define the appropriate scales and reasonable degree of the participation in PPP projects, so as to ensure the minimum return for private investors.

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## II. CORPORATE SOCIAL RESPONSIBILITY THEORY AND THE DECISION-MAKING OF PRIVATE SECTOR COMPANIES IN PPP PROJECTS

Every decision is made to achieve certain objective in accordance with some theories and criteria, while the decision-makers attempt to realize their self interest to the utmost through the processes of pursuing, identifying, creating and allocating social sources and interest[4]. A PPP project is an integrated project involving different interest groups, each with its own requirements for interest (Fig.1). For private sector companies, economic profit can not be adopted as the sole criterion any more of participating in PPP projects, instead the principle of "sharing value" should be observed with the overall contribution rate as the necessary criterion, which is in line with the corporate social responsibility theory.

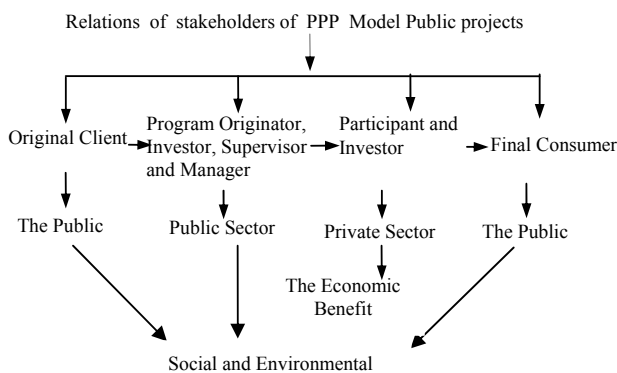


Fig. 1 Relations of Stakeholders of PPP Model Public

After its development of nearly half a century since the English scholar Oliver Sheldon put forward the corporate social responsibility theory in 1920s, the concept of social responsibilities has gained more and more attention, with scholars at home and abroad putting forward various interpretations and opinions towards it. One of the most currently popular definition of corporate social responsibility is[5]: different from business responsibilities, corporate social responsibilities mean that besides being responsible for stockholders in creating wealth, the companies should assume certain social responsibilities, including abiding by business ethics, protecting laborers' rights, protecting environment, promoting charities and so on. Liu Shiyu has classified those various opinions and makes a comment that classic economy overemphasizes profit maximization for enterprises, while the view of infinite responsibilities overemphasizes the social responsibilities, both of which do not meet the demand of social development. On contrast, social responsibility theory is in the middle ground between these two viewpoints[6], "the purpose of the existence of modelm organization is to provide certain special service to the society. The most contribution they can make and the biggest social responsibilities they can take on are to reach the most outstanding achievements within their functional authority." This is to say that on the one hand, the companies should shoulder the overall responsibilities for the effect arising out of their operating activities; on the other hand,

they should consider carefully as to whether taking on the social responsibilities for others' activities. Thus, the principle social responsibility for corporations is to acquire sufficient profit for future cost. Without accomplishment of this social responsibility, other social responsibilities can not be realized. Social responsibility theory, which stresses both responsibilities and the return on the part of private investors, provides a theoretical ground for the decision-making of private sector companies in PPP projects. It is certain that there are different social responsibilities for those companies involved in various types of public works, yet Pan Meicun thinks that all the public products to be provided by private sectors will usually be quasi public products[7]. This paper mainly examines this type of public works, such as those in electricity supply, gas supply and public rental housing. Applying social responsibility theory into the decision-making and management activities of private sector companies in PPP projects can help private parties make scientific decisions and recognize correctly their social responsibilities of participating in PPP projects, thus to meet the demand of relevant interest groups including public sectors by actively involving themselves in the participation and assuming specific social responsibilities. Meanwhile, it also provides a theoretical ground for defining appropriate scales and reasonable degree in participating in PPP projects and assuming social accountabilities for private sector companies, which will be an important contributor to facilitating the construction of public works delivered by the PPP model.

## III. ANALYSIS ON THE APPROPRIATE SCALES OF THE PARTICIPATION OF PRIVATE SECTOR COMPANIES IN PPP PROJECTS FROM THE PERSPECTIVE OF SOCIAL RESPONSIBILITIES

Public investment, as an important macroeconomic measure, plays a vital role in social and economic development. In the end of 2008, China launched a "four-trillion-yuan" stimulus package to deal with global financial crisis, an enormous amount of money of which was invested in public projects. Take the year 2009 as an example. The central government allocated 908 billion RMB for public investments, which accounts for as high as 65% of the total investment value. Compared with the difficult fiscal situation faced by the government, private capitals are considerably sufficient. As shown by the statistics from the financial institution (Table I), during the first five months of 2011, corporate and individual deposit value account for more than 93% percent of the total deposit value in each month. With the rapid growth in construction of public projects, the PPP model, as an effective way of attracting private capitals, offers a feasible method for private capitals to go into the construction of public infrastructures. The participation of private sector companies in PPP projects not only contributes to social harmoniousness and industrial prosperity, but also relates to the survival and development of the companies themselves. According to social responsibility theory, private sector companies in PPP projects should assume relevant social responsibilities towards the

stakeholders that the construction will have an impact on(Fig.1). The general public is the original consignor and direct consumer of the public projects, while public sectors are the initiators of the public projects, both of which are important interest parties for the construction work of private sector companies. For private sector companies, decisions of taking part in the PPP projects are made as to whether there are benefit and tax revenue arising out of the projects or favorable terms and protection offered by the government policies in financial aspects, after they take social responsibilities towards public sectors and general public to meet their interest requirements. It means that private sector companies will first analyze the PPP projects they are going to participate, and determine whether a minimum rate of return can be obtained from the projects or favorable terms offered by government policies after their interest requirements are satisfied, then decide whether to continue or give up the projects accordingly.

*A. The cost of the participation of private sector companies in PPP projects from the perspective of social responsibilities*

“Companies must integrate social interest into their framework of core philosophy, and use it to direct themselves in their efforts of interpreting market competition and making operating strategies.”[8] Some sacrifices will need to be made by private sector companies in public works delivered by the PPP model as to shoulder specific social responsibilities. Assume that one private investor use its capital (C) to develop a for-profit project near a public work and will later have it sold or rent. As the project is operated in the environment of market economy, the criterion of economic benefit will be employed to analyze the project and make decisions. Suppose that the economic benefit is  $R_2$ , and due to the constraints of laws and regulations the social and environmental benefit is  $R_2'$ , as shown by Fig.2. Then assume that the company participates in the public work delivered by the PPP model with the same amount of investment of C, now the economic benefit will decrease from  $R_2$  to  $R_1$ , or even be a negative value while the social and environmental benefit will increase from  $R_2'$  to  $R_1'$  for the reason that public works are in public interest and stress social and environmental benefit. If to ensure the benefit of the company remain at  $R_2$ , then the products offered need to be rent or sold at the market price, and this will obviously increase the burden on consumers, which goes against the original intention of employing the PPP model to deliver public works. How to make private sector companies take on specific social responsibilities and also actively participates in the construction of PPP projects?

*B. The benefit of the participation of private sector companies in PPP projects from the perspective of social responsibilities*

“No healthy society will exist without successful corporations...If the government or general public weakens the abilities of companies so as to enhance own impact, then even they win the battle, the whole war is lost.”[8] A minimum return should be guaranteed for private sector companies, so as to compensate for their assumed risk and support them to shoulder possible accountability in the future. The return will come from two sources. For one thing, PPP projects are usually key projects of local government, and private sector companies need to go through rigid investigation of their experience, technology, management and so on to get selected. Once private investors become the partner in the PPP projects, both their reputation and the social recognition of their products will be increased, and its brand marketing will be enhanced, which will help attract elite workforce, thus bringing an implicit benefit. For another, explicit benefit can be obtained from the users of the products or services, such as electricity bills, water bills, rent of public rental housing and so on. Yet due to the social benefit of public project, usually the charging can barely reflect the actual profits of the projects and can scarcely cover the requirement of a minimum return for private investors ( Assume the minimum return is  $R_m$ ,  $R_1 < R_m < R_2$ , as shown by Fig.2 ), this is when favorable terms offered by government policies from public sectors are in need.

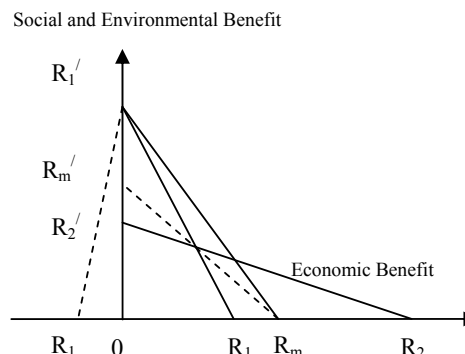


Fig. 2 The Change Chart of Economic, Social and Environmental Benefit under the same amount of investment

TABLE I

SUMMARY OF SOURCES AND USES OF CREDIT FUNDS OF FINANCIAL INSTITUTIONS ( ¥100 MILLION )					
Item	2011.01	2011.02	2011.03	2011.04	2011.05
Total Deposits	712828.05	726017.64	752838.40	756262.39	767339.00
In Which :					
Corporate Deposits	350843.47	356999.19	374256.70	378467.18	385247.04
Personal Deposits	318650.71	321331.64	331911.97	327282.87	328181.24
Other Deposits	43333.87	47686.81	46669.73	50512.34	53910.72

Source: the people's bank of china

The supporting of the policies can maintain the social and environmental benefit of public sectors at  $R_1'$ , not decreasing to  $R_m'$ , meanwhile the private sector companies can get the minimum return  $R_m$ . There are several ways of providing favorable policy support: (1) tax or fee reduction or exemption; (2) valuation of specific benefits, such as the benefit from the added value of the real estate produced by the projects; (3) relevant benefits arising out of the public rental housing—such as revenue from advertising and so on. All in all, it is a critical to attract the participation of private sector companies for ensuring the quality of the construction and effective management, and realizing the target of delivering public works by the PPP model.

IV. CASE ANALYSIS

To guide a rational and healthy development of China's real estate market, the public rental housing, which are built with the aim to solve the housing problem of "sandwich-class", has drawn wide attention nationwide. However, during the construction process of the public rental housing, the problem of insufficient public funds is experienced everywhere nationwide without a single exception. Chongqing government plans to invest 100 billion RMB in the project of building a 40 million square meters of public rental housing, the construction of which will start from 2010, with the purpose to solve the housing problem of 30% of the low-income group in one project. The contradiction between the for-profit feature of the public rental housing and the huge demand for construction money (Table II ) makes the PPP model very appropriate for this project. Take the project of the public rental housing in Chongqing which is named "Min Xin Jia Yuan" as an example to examine the appropriate scale of private sector companies in the public rental housing project delivered by the PPP model (only explicit benefits are discussed here due to the constraints of the data). In order to discuss the extent and feasibility of the support of government policy, the method of dynamic analysis of net present value (NPV) is employed, supposing that the private sector company is to acquire a 10% minimum rate of rate (as suggested by industry practice).

The sum of the present values of the annual net cash value during each year of the construction period by the expected rate of return is to be calculated in the method of net present value.

$$NPV = \sum_{t=1}^n \frac{C_t}{(1+r)^t} - C_0$$

In this formula,  $C_t$  refers to the net cash flow of year  $t$ ;  $r$  refers to expected rate of return (which equals to 10%);  $C_0$  refers to the present value of initial cash outflow.

The construction of the "Min Xin Jia Yuan" project started on February 2010, and will be completed within a year. The total construction area is 1.17 million square meters, including the residential building and affiliated commercial facilities, the area of the latter accounts for 10% of the total area. At present,

the rent of public houses is only 60% of that of commodity apartments of the same quality at the same district, with a rent of 10 RMB per square meter and a construction cost of 2500 RMB per square meter, both of which are calculated in terms of building area. As the project is to be completed in one year, the project can be supposed to be financed by one-time capital investment, and the affiliated commercial facilities can be supposed to be sold directly by 15,000 RMB/m<sup>2</sup> which is equal to the average sales price of other nearby shops. Suppose the private sector company wants to get back his investment within five years. Its cash flow chart is shown in-Fig. 3.

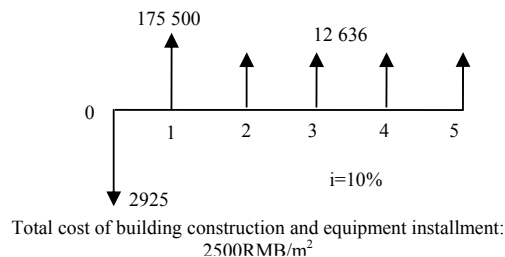


Fig.3 Cash flow chart of the public rental housing project of "Min Xin Jia Yuan" in Chongqing

Calculation process:

Initial cash outflow:  $2\ 500 \times 1\ 170\ 000 = 2\ 925$  million RMB

Present value of cash inflow :

The first year:  $10\% \times 1\ 170\ 000 \times 15\ 000 / (1+10\%) = 175\ 500 / 1.1 = 159.46$  million RMB

The second year:  $10 \times 90\% \times 1\ 170\ 000 \times 12 / (1+10\%)^2 = 12\ 636 / 1.21 = 104.43$  million RMB

The third year:  $10 \times 90\% \times 1\ 170\ 000 \times 12 / (1+10\%)^3 = 12\ 636 / 1.331 = 94.94$  million RMB

The fourth year:  $10 \times 90\% \times 1\ 170\ 000 \times 12 / (1+10\%)^4 = 12\ 636 / 1.4641 = 86.31$  million RMB

The fifth year:  $10 \times 90\% \times 1\ 170\ 000 \times 12 / (1+10\%)^5 = 12\ 636 / 1.61051 = 78.46$  million RMB

Total present value of cash inflow of the five years: 1959.60 million RMB

$NPV = 1959.60$  million - 2925 million = - 965.40 million RMB

Note: the factor of the increase in rent is not taken into consideration

As shown by the calculation result:  $NPV < 0$ , therefore relevant policy support is required from the government in order to guarantee a 10% minimum rate of return for private sector companies, if the factor of the present value of investment return of the five years is the only consideration, or private investors will give up the projects.

This can be demonstrated by following formulas:

Guaranteed return for private sector companies = total return of the project  $\times$  proportion of the investment of private investors + subsidies from public sectors

If the return for private investors  $\geq$  minimum return, the subsidies from public sectors equal to zero;

If the return for private investors  $<$  minimum return, then the direct return from the public rental housing project for private investors is composed of the return from the project and the subsidies from public sectors.

In fact, according to the regulations of Chongqing government, public rental housing can be rent as before, or sold after five years, and the rent will increase with the change of the rent in the market.

Now to calculate the extent of government policy support supposing that the public rental housing will be sold after five years, the change in the rent is not taken into consideration. Based on the housing price of second-hand houses in 2008, 2009 and 2010 in Chongqing, and proper adjustment to the statistics of the year 2008, the average growth rate of housing price of second-hand houses in Chongqing can be calculated, as shown by Table III. These statistics will be used in the calculation of the sales price and sales proportion of the public rental housing after five years, supposing that the private sector companies can acquire a 10% return.

TABLE III

SECOND-HAND HOUSING PRICE IN CHONGQING (RMB/m<sup>2</sup>)

Year	2008	2009	2010	2011
Average Price	3800	4590.5	5593.7	6903.33
Growth Rate (%)	—	20.8	21.85	23.41

Source: <http://cq.fangjia.com/zixun-0-year/>

Use the average growth rate of 22.02% to calculate the housing price in 2015:  $6903.33 \times (1 + 22.02\%)^5 = 15303.22$  RMB/m<sup>2</sup>

To be in line with the policy that the rent of public rental housing should be 60% of that of the market rent, the price of the public rental housing after five years should be 60% of the price of second-hand houses in Chongqing:  $15303.22 \times 60\% = 9181.93$  RMB/m<sup>2</sup>

If the value of the sales proportion after five years is Y.

$Y \times 90\% \times 1,170,000 \times 9181.93 / 1.61051 + 1959.60$   
million = 2925 million RMB

$Y = 16.08\%$ .

This means that, the private sector companies can get a 10% minimum rate of return, if 16.08% of the total volume of the houses of "Min Xin Jia Yuan" project can be sold out by the fifth year after its launching, at 60% of the price of the second-hand houses in Chongqing. Then, the decision-making criterion for private investors is to sign a contract with public sectors to guarantee the sales of 16.08% of the public rental housing, or they will give up the project. At present, Chongqing government plans to change the application standard for the public rental housing, so that the houses can be available for people with a monthly income below 5000 RMB. Given the annual salary for people in non-private companies in 2010 is only 35,326 RMB (2,943 RMB/ month) in Chongqing[9], it

will be relatively easy to reach the sales proportion after five years. The extent of the support from government policy can be also calculated if the affiliated commercial facilities are not be sold, but rent. Only the explicit benefit of private sector companies in public rental housing project to be delivered by the PPP model is taken into consideration in the above analysis, yet if the implicit benefit is to be taken into consideration, actually the minimum return for private sector companies can be less, which will be accepted by the public sectors more easily, and the target of building public rental housing with private sector companies can be achieved more easily, yet further analysis is still required in the future.

## V. CONCLUSION

In short, private sector companies in the PPP projects should make their decisions on the basis of social responsibility theory, identify objectives of the participation in PPP projects, and calculate the appropriate scales and reasonable degree through the cost-benefit analysis so as to ensure a minimum return, while support from government policy is in need if private sector companies can acquire a minimum return.

In western developed countries, there is solid theoretical foundation and rich experience in public works to be delivered by the PPP model, while there is no existing experience and model can be directed applied to China due to its late introduction. Thus the analysis of this essay is just on the theoretical level, though the NPV method has been employed with a cost-benefit analysis of private sector companies in the project of "Min Xin Jia Yuan". The calculation of some of the statistics, including the minimum rate of return, is on the basis of certain hypothesis, so further analysis is required in the future towards the ways of providing subsidies from public sectors and so on. This essay aims to provide a framework for the construction of the PPP model for private sector companies in public works to be delivered by the PPP model.

## ACKNOWLEDGMENT

This work is supported by Chongqing Municipal Commission of Urban-Rural Development under Grant No. 2011-110, "Research on Construction Mechanism of PPP of Government Public Projects in Chongqing Municipality", and the Construction S&T projects in Chongqing Municipality of China under Grant No. CSTC, 2010CE0112, "Research on Construction Mechanism of PPP of Key Public Projects in Chongqing Municipality".

## REFERENCES

- [1] Jianqiu Liu, Xianzhong Song, "Social responsibility and the mechanism of establishing corporate value: a research framework," *Accounting Communications*, pp. 127-130, July. 2010.
- [2] Shuhao Wang, Zhuofu Wang, "Analysis on problems involved in the participation of private investors in infrastructure construction projects of the PPP model," *Construction Economics*, pp. 65-67, December. 2009.
- [3] Jianying Liu, Shengjie Li, "Study on the sharing of BOT risks from the perspective of relevant interest groups," *Modelm Business and Trade Industry*, pp. 194-195, April. 2010.
- [4] Xizhen Gao, Tong Cheng, "Analysis on the decision-making criteria in public projects," *Architecture Economy*, pp. 31-33, May. 2009.

- [5] Junhai Liu, "Social responsibilities of the corporations [M], Beijing: Law Press, 1999.12-13
- [6] Shiyu Liu, "Analysis on the cost and return compensation of companies taking social responsibilities," *Academic journal of Dongbei University of Finance and Economics*, pp. 73-76, June.2009.
- [7] Meicun Pan, "Study on the cost and benefit of public products," *Academic journal of Southeast University*, pp. 57-61, September.2004.
- [8] Michael E. Porter, Mark R. Kramer, "Strategy and Society: Link between Competitive advantage and corporate social responsibility", *Howard Business Review*, November. 2007.
- [9] Wei Cheng, Chongqing plans to expand the appliance standard of public rental housing to people with income below 5000 RMB, *Business News*. May.2011.