

A Transition of the Brownfield Holding Firm in China

Hao Wu ^{a*} and Bo Qin ^b

^a Melbourne School of Design, University of Melbourne, Melbourne, Australia; ^b School of Public Administration, Renmin University, Beijing, China

*corresponding email: haow@unimelb.edu.au

Abstract

China's industrial structural variation has led to emergence of many former industrial sites turning into alternative uses. This paper examines one of the large brownfield sites located in Beijing and its asset holding state-owned-enterprise (SOE) for both of their transformation. It explores a social cost minimising mechanism for brownfield site. Historic and spatial patterns reveal not only brownfield reuse as re-development, but also transformation of the asset holding organisation. Results show some forces behind transformation of brownfield site and its asset holding organisation. Considering costly institution innovation, firm structure change, socio-politico interplay, SOE may act like the bearer of social warranty to balance or internalise brownfield development risk and social cost. Findings are directly policy relevant.

Urban economics.

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Keywords: brownfield development; transaction cost; liability; firm structure.

1. Introduction

China's industrial structural variation has led to emergence of many former industrial sites turning into alternative uses. This paper examines one of the brownfield sites located in Beijing and its asset holding state-owned-enterprise (SOE) for both of their transformation. It explores a social cost minimising mechanism for brownfield sites to identify historic and spatial patterns to reveal not only brownfield re-development, but also asset holding firm's transformation. This paper focuses on structural change of the Beijing Capital Iron-Ore Enterprise (the Shou-gang Group), asset holding firm of the brownfield site. Forces behind transformation of both the brownfield site and its asset holding organisation i.e. the Shou-gang Group help create new institution to internalise project risk and social cost. Findings are directly policy relevant.

This paper focuses on liability, incentive and organisation change of SOE-led former industrial land development. A SOE may be described as a representative agent of the state with control, bargaining and political power objective functions on property

e.g. brownfield assets –. It is expected that new firm structure emerges to capture brownfield asset's expected residual income. It is a mechanism of productivity and resource distribution i.e. relative efficiency of alternative institution. Backed by the state, SOE bears brownfield asset liability and social cost, which evolves new structure corresponding to transaction cost. It interacts with local authority, with some conflicting interests, is a unique competitive profit maximising case – a production model of input-output of productive factors e.g. land and capital, and relative transaction cost.

This paper is structured as the following. Section 2 establishes the literature and theoretical basis of brownfield development and its related social cost. Section 3 focuses on firm structural-organisational change relating to brownfield asset. Section 4 shows the brownfield case and its specifics. Section 5 shows findings of the unique data of the BCE spatial-organisation patterns given brownfield asset specificity. Section 6 concludes with note on research limitation and future directions.

2. Brownfield Development and Social Cost

2.1. Land Redevelopment

Urban growth is treated in economics e.g. land value theory and geography e.g. planning and design theory. The ideas of urban and regional development involve a diverse range of spatial transition, driven by human actions. The study of land use change and development is explained by such theories as urban growth, spatial integration and dynamics. Urban growth implies an expansion of population and land use, which is a key area of the study of urbanization and space choice and change. One may consider space production theory e.g. Lefebvre (1974) as socio-political theoretical alternative. Urban integration concerns merging and combination of land use functions, links to economic geography e.g., agglomeration, laying special interest in new spaces

such as edge city, urban village and industrial park. Urban dynamics involve complex process of redevelopment and regeneration in the spatial economic context (Landis and Zhang, 1998; Landis et al. 2006). For historical and theoretical reasons, redevelopment dynamics are relatively under-researched. Glaeser et al. (1992) offer empirically test and compare urban dynamics in neoclassical and competing urban growth theories.

Non-residential space appears out of the rational choice theoretical base. Although triggered the central place model (Mills, 1976), little is explained of the mechanism of non-residential property redevelopment during urban decline (Glaeser and Gyourko, 2005). There is a literature stream to address CBD decline based on growth theory, economy of scale and economic base. However, the theory of revitalisation from residential perspective needs further development (Myers 2003). There is potential need to integrate these aspects in a coherent way to improve the analytic quality of residential and non-residential redevelopment, integration and diversity. Large-scale brownfield development involves such spatial transformation. There is also a stream of literature of urban development theory and a developmental state approach to urban development in the Chinese context (Wu 2001; Zhu 2004; Zhu 2005; He and Wu 2009). They are China specific macro-theories relevant to this study.

2.2. Brownfield and Social Cost

Sustainable spatial urban and regional development aims to incorporate environments in the study of land and land use and brownfield development is an effective carrier of this inquiry. One approach is the transaction cost approach, focusing on the ownership and control of landed property asset and associated organisation arrangement. It is important to recognise that land and its location are a concept that serves dual roles. Land and capital improvement hold wealth and monopoly rent as the underpinning income basis. Land also bears damage to it i.e. social cost such as pollutant. So there is the symmetry

of the role of land, its location, and operator. Institution and technology are human knowledge to balance cost and wealth, applicable to location being the carrier of the cost-wealth condition. These ideas help explore interplay of location, institution, and technology.

Brownfield development involves extra risk and cost (Wu et al. 2017b). Large-scale industrialisation and the planned allocation approach have shaped industrial districts in Chinese cities. In recent years most face reformation and brownfield development. Industrial districts at certain locations are now brownfield districts. They face opportunities to be redeveloped into efficient land use. Research on brownfields in the Chinese context is increasing by scale and coverage. Urban redevelopment and industry structural change both demand in-depth knowledge of brownfield sites and development risk and cost. Liu et al. (2014) develop a framework for brownfield development in the Chinese urban context. From institutional determinants perspective, they study brownfield in the urban and urban village contexts. Wu and Chen (2012), Li (2011), Xie and Li (2010), Wu and Chen (2010), Cao and Guan (2007), World Bank (2005) studied China's brownfields and site development. Gong (2010) evaluates international brownfield management experience. Wu et al. (2017a) examine brownfield risk factors and risk ranks amongst key actors in brownfield projects. Cost and risk are natural substitute in the context of expected social cost evaluation.

Theory of public enterprise and organisation transformation suggest that the government may be understood as a super firm producing several valuable social goods (Coase 1960, pp.17). SOE may be described as a productive firm with administrative decision power. They create the SOEs for resource allocation. They use administrative process (the firm) to work with (or replaced by) private transaction. Social, political and economic structures tend to find consistency in specific capitalist or socialist context.

Studying the subject matter from these aspects helps derive insights of spatial structure change such as large to median urban area transformation. It gives a balanced view and the analytic basis for land investment, development, urban planning and design process and decision-making. This Analytic framework suits the study of land use change, urbanisation, urban-rural land use interaction, urban development and production areas.

2.3. Internalisation of Liability and Social Cost

The right-liability symmetry principle is significant for distributional fairness. Like the right, liability is subject to different degrees of conceptual clarity and measurement costs under various institutional arrangements. The ownership of liability in a property can be asymmetric to the ownership of right in the property. It raises the question what is the right and liability that one owns? How clearly are they definable? Do SOE and private developer differ in their risk preferences and appetite? All make the risk allocation mechanism important. For instance, private insurance market and public liability redistribution via fiscal policy and public finance are typical responses. At decision level, risk criteria and decision contexts are important. Risk aversion and opportunism become closely relate to the observed right-liability asymmetry in practice. All help raise questions such as are SOE suitable organisation means to hold social cost even though it is difficult to assure that it will perform transaction cost minimiser role during institutional change.

Change in firm structure reflects new institutional arrangement to internalise social cost. Demsetz (1967) argues that new or changing property rights and organisation specifications are associated with the internalisation of harmful and beneficial effects in human interaction. One needs also to recognise that modern organisations demands more complex analysis than property rights. There is an extensive literature on environmental damage liability developed in industrial nations.

The China case clearly presents ambiguous liability and rights, and adverse selection. Inadequate legal and social clarity of “liability” and the “entity” e.g. individual or organisation that should bear the liability are common during economic transition. Ambiguous property right and liability lead to adverse selection and raise future transaction cost or risk to very high level. Like the industrialised cities’ case, high transaction cost pro-logs time of land redevelopment. Institutional change and the clarification and effective enforcement of right-liability are important to reduce transaction cost related allocation inefficiency. Specifically, the following ideas are considered: (1) the legal and social clarity of liability; (2) legal and social clarity of the entity i.e. individual or organisation; (3) the symmetry of rights and liability driven by enforceable mechanism.

Heterogeneous liability holders with different capabilities affect the process and the performance of brownfield development. They should be included as key analytic element. Current literature assumes homogeneous individual or organisation as representative agent. This may be insufficient to explain brownfield development decision in China. A theory of firm needs to integrate the existing analytic framework of urban brownfield development. The importance and the problem faced are clear. Centrally located brownfield redevelopment, controlled by one multi-capacity state owned enterprise may we treat it as part of or closely relate to government action? Conflict between the district government and the SOE has been observed. Conflict may exist between the planning route and the liability holder i.e. the Shou-gang case.

Innovation is required to treat the case. The following are proposed or partially observed: (1) land supply and planning control: central/city government provides highly flexible land use and supply policy for redevelopment, infrastructure investment and not for profit uses. (2) Finance: government and the firm (Sou-Gang Group) to form joint

venture and new finance products. (3) Planning administrative: efficiency and simplification of administrative procedure. There is the trail-error approach of national importance to a complete land transformation – i.e. the transition of land use literature and theory, and possibly an “urban growth” if more productive land use dominates.

It is important to understand under what legal principles, the symmetry of right and liability is to evaluate and judge environmental decision. This is of high importance from the government policy and rules enforcement perspective. It is expected that a new firm will emerge to ‘internalise’ social costs i.e. to keep continuity of the rights-liability balance or symmetry in large-scale brownfield redevelopment. What this may bring may be: (1) innovation in land investment or redevelopment model, and (2) a SOE reform and asset transformation model. There is practical innovation potential for enterprise reform and market-driven brownfield development model. It highlights institutional innovation in organisation reform in China, which shows the symmetry principle in social system dynamics.

2.4. The New Firm

The Shou-gang Group is one of the national level SOEs in China. It is interesting on its own itself to consider the land use and land ownership specifications of SOE. The firm has undergone marketization and substantial business restructuring since the 1990s. One important advantage for the new firm to compete in the marketization process is the trail-and-error approach that is effective in the economic reform and transition in China. At the social and spatial level, there is tension between the district authority and the SOE. Government policy or rules often reflect innovative reaction to market and social changes. It too will influence institutional innovation at organisation level. The organisational change to internalise cost of liability is a firm level innovation. It keeps the continuity of the balance of rights and liability. This is due to substantial

asymmetrical information accumulated when former industrial organisation has held the land and asset for prolong time. The SOE has held the site for iron-ore production for over 90 years. It holds substantial internal information. The search and experiment by new land users can be extremely costly. The challenge is, therefore, a mechanism that could motivate the information holding firm or owner to fully engage in the redevelopment so that valuable land use knowledge is utilised.

It has long been established in the public economy literature that SOE faces similar economic questions as the society has. For example, "...when the Government is in a similar position to a private landlord...exactly the same difficulties arise as when private individuals are involved." (Coase 1960 p.39) Boardman and Vining (1989) compared the private, mixed and state-owned enterprises in 500 non-US industrial firms in competitive market economies to examine their relative performance. They discover performance difference amongst these 3 forms of enterprise. Their study does not include SOEs in planned and transition economies. The key in state ownership and SOE is asset low-transferability. The change in separating ownership and control in the SOEs in the Chinese market environment is an interesting perspective responses to organisation survival and efficiency in land development processes.

New firm emerges to facilitate efficient production and to control for transaction costs is projected from a contractual arrangement perspective (Barzel 1997, Cheung 1983). It is interesting to explore how a SOE that was preciously structured for production may reorganise itself to deliver to cope with diverse and complex production or asset holding process? One may ask what this new firm should be as the proposed new structure that is operationally more efficient relative to the existing forms? The challenge to address such questions is that the validity of innovative new organisation is tested trial-and-error. It is risky process. The nature of SOE underlies contract making

decision as non-private firm. The nature of brownfields has the focus on property asset information and its cost. It involves the role of the state's role as equity capital insurer for the SOE (Barzel 1997). Theory predicts that as social change occurs, innovation, new institutions and new organisation will emerge for SOE to perform its new role as an agent in economic development (North, 1990). Given transaction cost and the path dependency nature of existing institutions, the new setting may not be cost effective to achieve improved efficiency. It is sometime useful to examine if it is still valid to regard the new organisation as a SOE with substantial structural changes.

Given the often ambiguous SoE and local government relation, which in this case presumably combines competitive and collaborative incentives under a frame of state internal bargaining, the new firm aims to reduce transaction cost due to the SOE vs. local government competition. through alteration to public finance innovation and local infrastructure provision. Change of organisation from iron-ore related SOE to development entity – the Beijing Bureau of Commerce and Industry records new firms as part of the development arm. Before the relocation and organisation structural change, the development arm only served the SOE. After the transition, it is likely to interact the broader market and city demands. As contractual pattern of right and liability changes over time, SOE structure is expected to change. So is the social and market role of the new organisation. One comparative perspective may involve POE, SOE and NFO (Boardman and Vining 1989).

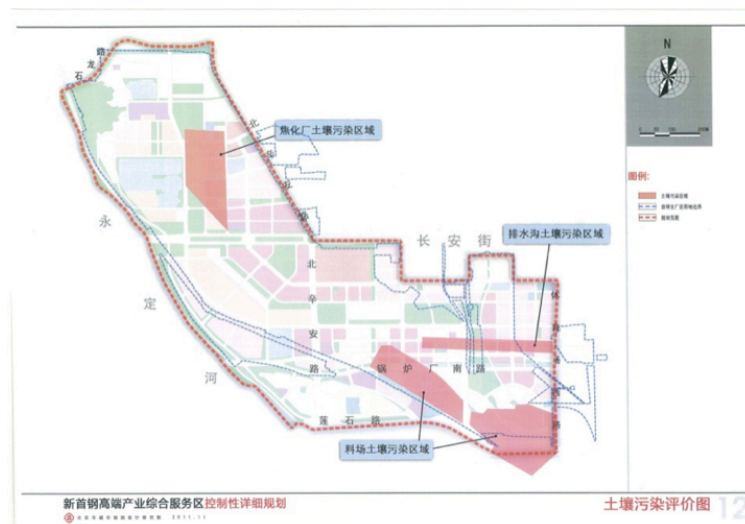
3. Specific Brownfield Asset

3.1. SOE and the Site

The Shou-gang Group, a national level SOE industrial firm, is effective user controls the brownfield site. Over the 90 years of its land operation, the firm has invested and

built substantial level physical and social capital, including building, infrastructure, and housing. Figure 1 shows details of the site. In neoclassical economic theory, capital and land are substitutable factors for production. This study focuses on a centrally located i.e. Beijing's inner-west district former heavy industrial district largely planned and established during the planned economy period during the 20th century. It is of very large-scale, approximately 8.7 km². Although it has been progressively relocated since the late 2000s, the vacated lands are of significant high value due to scarcity of land supply and its central locality for highly valued alternative land uses in Beijing. The land value however assumes low contamination, which is less likely in this case. According to the master planning and related planning policies, the redevelopment goal is a "culture recreation district" in the city's inner-west. Currently the site has its locational features: It is located at the inner area of Beijing, 14 km west of the CBD. The district has 640,000 of local residents. The district is 84.38 km² where the brownfield site is 8.63 km². There are 22.3 km² of associated development area.

Figure 1. The capital iron-ore enterprise site



(Source: Shou-gang development plan 2015)

3.2. The Institutional (Regulatory) Environment

Laws, regulations and political hierarchy are critical concerns to SOE asset holders. The key policies for urban redevelopment and planning at the central and local government levels, including the master plan of Beijing (2004-2010), the State Council issued guiding principles for urban old industrial district relocation and redevelopment, the Beijing city issued a guiding note for the BCE industrial district restructuring and redevelopment and an action plan to perform the BCE local and nearby area development and redevelopment. The directly relevant regulation and policy include: (1) the Master Plan of Beijing (2004-2010); (2) State Council Order: General Guides on Promoting the Relocation of Old Industrial District. (3) the Beijing Government: General Guide on the BCE Industrial District Reconfiguration and Redevelopment. (4) Implementation Redevelopment Plans of BCE Industrial District and Surrounding Areas. At legislative level, the directly associated law to urban brownfield land development include (1) the Land Administration Law; (2) the Urban Real Estate Administration Law; and (3) the Property Rights Law.

4. Organisation Transformation

4.1. Brownfield Development and the Firm

this paper intends to develop a preliminary story to match theory and the Beijing case. The SOE occupies a large area of prime urban land for many decades and expects substantial liability, knowledge and capital accumulation. Theory of liability and firm transformation cross sectional conditions of an organisation as organisation structure change – how to analyse institutional change e.g. legal rights, social norms? These ideas may be realised through clearer articulation. Liu et al (2014) suggest a 3-stage approach, e.g., industrialisation, sub-urbanisation, de-industrialisation, to the emergence of

brownfields in China. The legitimacy of the categorisation may attract further debate, but it provides an approach to economic change that underpins the physical pattern of land use. Sub-urbanisation corresponds to short-term government-led to declining land value due to changing highest and best use at central urban locations. De-industrialisation refers to real change of the foundation of existing industries. For example, urban restructuring may relate to the rise of the service industry.

A similar approach can be applied to Melbourne large-scale brownfield development e.g. Fisherman Bend development or Docklands. Places Victoria could be an equivalent in the Australian context (Wu and Chen 2012; Wu et al. 2016). Urban village in brownfield zone in the Shou-gang case. What is urban village and what is brownfield when they are combined? Addressing it would be a possible improvement to Liu et al (2014). The authors discuss brownfields located in urban village. Neither estimate scale of brownfield, nor contamination level is explained. Bob (1989) modelled pollution caused dispute and liability under private negotiation. Pesendorfer (1998) continues the inquiry of Bob (1989), he argues that with very large number of agents, transaction relating to pollution may become “efficient”. It is likely that his model is based on information symmetry assumption. In thin market of limited number of firms (agents) it may face difficulty to behave as his model suggests. Smith and Wolloh (2012) study the relationship of major legislation and environmental quality in this case water quality. A similar methodology may be relevant to examine other issues such as land contamination such as brownfield development.

4.2. The New Firm as Mixed Organisation

The Shou-gang Group has grown into a complex organization by scale, structure, and ownership-control structure. This paper assumes that the BCE site is directly controlled and administered by the BCE Group as an emerging new firm. This study examines

China's state-owned enterprise i.e. the BCE brownfield development conditions and innovation. It looks into such issues as restructuring, integration and redevelopment: SOE-led brownfield development marginal change to integrate land development and social impact through coherent analytic of 'institutional space' and lower cost soil decontamination. One innovation is to use institutional space to illustrate institutional change that is linked with former SOE-occupied land and contamination, adds to current analytic to China's urban growth. Outcome will relevant to aspects such as development policy evaluation, SOE-led development model, and public finance instrument. What has it changed to from a pure SOE when it starts to run and develop the brownfield site? One example is Shou-gang Properties, formed in 1998. The Group's associated asset holdings are wide and diverse by list and conditions. The list of enterprises and organisations with capital iron-ore in their registered firm's names. Table 1 shows that most new firms are registered under the Shou-gang Group as asset holding firm.

Brownfields development also relates to organizational change where SOE transformation and land ownership rights innovation are the 2 key issues. This requires in-depth study of structural change and theory of the firm e.g. forming of new firm or organization, for example: how to analyse and evaluate the two different issues of efficiency and fairness? Does organizational change lead to change in production, land use, capital formation? What is the relation between land use change due to political, economic or organisation change? What is the relevance of endogenous urbanization? What theory explains the relation and interaction of SOE and government? Ownership variation is most ferocious, even for 'state-owned' property. It may be right that 'state ownership' of land offers higher certainty than 'collective ownership' rights, is less certain than private land ownership with state power i.e. 'eminent domain'. Will this difference in property rights leads to differentiation in land value growth? As land value

rises i.e. the residual, property right is delineated into more detail, to matches Adam Smith's (1776) specialization, division of labour and efficient exchange. Will this explain the transformation or evolutionary path of China because sophisticated property rights match high specialization and capital (land) value? Brownfield development concerns relations between property rights and capital value.

Table 1. Organisation change and diversity

Investor Asset Holding	Number of Firms
China Shou-gang International Trade & Engineering	16
Yantai Shou-gang Dongxing Group Ltd	1
Shou-gang Group Labour Services	4
Shou-gang Group Worker Union	6
Shou-gang Group	81
Shou-gang Changzhi Iron-ore Ltd	1
Shou-gang Mechanics Services Company	2
Shou-gang Mechanics	1
Shou-gang Labour Service Centre	1
Shou-gang Labour Services Company	2
Shou-gang Capital Control Ltd	3
Shou-gang Technical College	1
Shou-gang Environmental Insutrial Ltd	4
Shou-gang Fengguang Mechanics	1
Shou-gang Geological Surveying Instittute	1
Beijing Shou-gang Automatic Informaton Technology	8
Beijing Shou-gang Resource Development Company	3
Beijing Shou-gang Industrial Park Service Ltd	2
Beijing Shou-gang Special Iron Ltd	18
Beijing Shou-gang Real Investment Ltd	12
Beijing Shou-gang Construction and Investment Ltd	2
Beijing Shou-gang Development Group Ltd	9
Beijing Shou-gang Fund Management Ltd	15
Beijing Shou-gang Mechanic Ltd	11
Beijing Shou-gang International Engineering Ltd	9
Beijing Shou-gang Real Estate Development Ltd	4
Beijing Shou-gang Urban Operation Capital Control	3
Beijing Shou-gang Hotel Development Ltd	4
Beijing Shou-gang Start-up Investment Ltd Partnership	11
Total Number	236

(Source: The Bureau of Industry and Commerce Beijing 2017)

5. Discussion and Conclusions

This study looks inside SOE who controls brownfield assets to examine associated firm structure change. It aims to develop propositions, towards testable hypothesis, to relate organisation theory of the firm and large inner-city brownfield regeneration. Market-

based resource allocation raises cost of market exchange. It triggers competing mechanisms such as vertical integration i.e. new firm formation with diverse structures. The degree of internal integration and structure of the firm will depend on such attributes as asset specificity. We analyse the inter-relation of brownfield development and structural change of the SOE developer who was also the polluter. The idea is the internalisation of brownfield related social costs.

Intensifying future urban development to continue the use of existing capital and land productivity post-industrialization demands efficient land use transformation in the reuse of brownfields. Associated social cost is a key concern. This study investigates several critical aspects of a very large-scale former heavy industrial site that is managed and redeveloped by a major state-owned enterprise (SOE), in Beijing. Theoretical inquiry and case analysis show that, given the recently emerging legal institutions to regulate the reuse of former heavy industry sites – a sign of the rising demand for land use change. It presents ambiguous liability for brownfield redevelopment in Beijing's urban core. See Glaeser et al. (2016) and Sigman (2010). This paper argues the existence of a potential gain to internalise social cost by assigning the land use and redevelopment rights to the polluter firm. But that is not quite certain, given the uncertainty of institution set up. There is asymmetric information between the polluter landholder and the government or future users regarding the brownfield site. It could be less costly to engage the former to develop and operate the site, i.e., grant them residual rights by continuing this control of the real estate capital asset. Run it like a firm. How to deal with agency problem? These need information theory and power balance issues in supporting bargaining for market or vertical decisions.

One of the natural and essential consequences of the polluter landholder-led development is the emergence of new organisations as demand and incentive change.

This leads to new land use patterns. But it will depend on legal system and traditions. This paper sheds light on a potentially viable model of large-scale brownfield redevelopment in China. The model may be valuable for investigating cases in different contexts e.g. in the Places Victoria case in Melbourne or in developed and developing country comparative studies. There are potential and practical risks for institutional innovation, organisation structure, and socio-politico cooperation. It requires effective socio-political and financial insurance to balance the underlying risk/cost. The study hopes to contribute to theory of the firm and urban development. It discovers SOE brownfield holder has certain advantages in brownfield development when state guarantee and policy incentives are both available. Like typical vertically integrated organisations, SOEs are subject to typical principal-agent problem. Institutional innovation may not effectively resolve or reduce this social cost.

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