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Experimental coastal land reclamation: Qianhai as a case interpreted

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Abstract

Informed by a Coasian transaction cost paradigm enriched by the concept of Schumpeterian innovations, this paper discusses the advantages of using experimental coastal reclamation of the sea to build new cities with a policy for fostering innovations. A new development area at the margin of Shenzhen in China, Qianhai, is used to demonstrate how urban expansion by urban sprawling in a megacity can be avoided by reclamation of marginal land as analytically *institutionally* less costly than along intra-marginal land and more suitable for experimentation for the type of megacity concept that Qianhai aims to achieve.

> *History buffs may know the lessons of Venice and Hong Kong vis-à-vis Shanghai, and they may also realize that London is still a financial center despite the decline of the British Empire…*(Chan 2013: p.320).

I. Background

Political theorists have a perennial interest in *city states* focusing on their institutional arrangements and continuous institutional innovations. However, they may not have paid enough attention to that fact that many classic city-states depended on or were even products of reclamation. The economics of reclamation, nevertheless, always have a bearing on institutional changes.

Reclaiming the sea to produce new land has become a hot issue in recent years in international and regional politics, though this engineering feat for nation-building or development has a long history, with the insular city-state of Republican Venice and the Romanov Russian capital of St. Petersburg as the best-known examples. The rationale behind such designs could well be military, but the land formed has invariably become spatial platforms for new

modes of trade and development. Contemporary and ongoing reclamations have added a new dimension: the impact on sustainability (**Rooney et al. 2015**), which calls into question the tradeoffs or win-win solutions for a three-prong sustainable development strategy that stresses social, economic, and environmental concerns, given the ever-changing technology in today's economy.

There is no question that reclamation is now, as in the past (say Pointe Marshes), a way to capture the opportunity for *urban innovations* that serve various purposes. Frandsen (2001), in discussing politics of Pointe Marshes, stressed the "*tabula rasa* perspective of having an empty area without history and tradition." (p. 71) Lima (2011) gave us a good account from the point of view of a designer in relation to Macau and Singapore: "Land reclamation is presented as a global solution to the planned urban development the one that move us - , current and future. Land increase is today, more than ever -, driven by economic acceleration and competition that finds in the scientific novelty of its buildings designed - infra and supra structural -, the expression of politic, culture and social that mark urban territories, especially those of land reclaimed to water. Land reclamation has served political and hedonistic purposes with

relevant results, some problematizing questions within the new urban utopias - the ones that least concerns us." As pointed out by Lima (2011) in connection with Singapore and Macau, reclamations as "artificial landscape *tabula rasa*," are about "construction of urban space and as a place of development of science and technology."

This paper attempts to use a transaction cost approach of Coase (1960), which was extended to innovation (Yu 1981, Lai and Lorne 2014, Lorne 2019), urban planning (Webster and Lai 2003), and Chinese regional development (Wu 2000; Webster et al. 2016) to examine analytically the costs and advantages of coastal reclamation in a newly launched development project at the marginal spot of a Chinese Special Economic Zone that is itself a newly-emerged mega-city. This riparian-maritime spot is at a prime location! However, prior to reclamation, it was just an "opportunity site", to use the strategic planning vocabulary of Hong Kong (Lai and Baker 2014).

Its novelty lies in its explanation that reclamation is *institutionally* less costly and more advantageous than urban expansion using intra-marginal land. Most extant studies on reclamation are very general or historical (see, for instance, Pernice (2009), Choi (2014), and Wang et al. (2014)), but case studies are

essential for addressing specific theoretical and/or policy issues. A good example is Koh and Lin (2006).

Technically, costs can be easily quantified, given more or less fixed technology and summed as a supply curve; benefits can be represented by the market demand for land. Further advantages would depend on innovative uses that emerge and can be captured by a function that is greater than market demand. The consideration of costs and advantages here is NOT a micro cost-benefit analysis, as the focus is not on selecting options for reclamation sites, an exercise for which traditional cost-benefit analysis is useful.

Two key ideas are considered. First, the lower transaction costs of attaining the same benefit represented by market demand, given the reality that property rights over new reclamations are easier to define and allocate. Second, the prospect of new competitive advantages to come. These would generate what economists call "positive externalities" for land users. Qianhai is a committed urban experiment of the state to build a novel office *hub* rather than to just increase land supply for offices. Like any Schumpeterian innovation, it may ***succeed* or *fail*** (Yu et al 2000) If it does succeed, then the total

benefits will be greater than those of adding new quantum of office space due to externalities, which create new advantages.

II. Economic Benefits and Costs

Lai et al (2019) have reviewed the economic literature on various types of reclamation and we shall apply their model (as shown in **Figure 1**) to interpret the case of Qianhai.

Figure 1 denotes the optimal size of a city in that the benefits of the marginal contribution of land can be assumed to be the value added for citizens of that city. This can grow with an increase in the value of parameters such as wealth, population, and above all successful innovations.

The benefit side of the story is represented by the demand curve, D, for land. If Qianhai's Schumpeterian experiment, as will be detailed later, succeeds, then D will shift upwards to D' due to positive externalities. If it fails, D will declines to D".

It was noted that in the formulation of the paper by Lai, Lu and Lorne (2014), social costs were not taken into consideration, not to mention those regarding climate change and rises in sea levels. This

consideration can be easily integrated by noting that an inclusion of social costs would undoubtedly raise both intra-marginal and marginal land expansion. In other words, there will be four sets of curves to evaluate optimal megacity size instead of two sets that ignore any social cost.

Land reclamation as marginal land expansion can arguably manage environmental considerations more effectively than intra-marginal expansion. It is always easier to build than to remodel. Intra-marginal land expansion is notoriously subject to the transaction costs of dealing with local and regional politics by "holding out" problems and buying out/taking away existing prior arrangements. To the contrary, marginal land expansion through land reclamation is largely technical once the decision is authorized, with a cost that is arguably and considerably less than some megacity expansions, as the above table shows.

The caveats for marginal land expansion via land reclamation are the loss of biodiversity along the coastal regions, human valuation of sea views, use of natural beaches, etc. Indeed, for certain communities, coastal water holds such a high value that land reclamation is virtually impossible (e.g. California's coastline along

Highway 1). This can contrast with coastal areas that have been degraded due to prior waste emissions and, therefore, can no longer serve as dumping grounds due to the tragedy of the commons. Land reclamation can be a quick and fast way to bury "water garbage" through landfills. This type of land reclamation not only has little social cost, but arguably has huge potential social and ecological benefits, depending on the scale of the reclamation and the ecological sensibility and credibility of the technology involved.

II. Qianhai: An Attempt to Achieve International and Regional Significance

The focus of the extant research on Qianhai as a Shenzhen development issue has been mainly on its engineering techniques and costs; ecological impacts (Ren et al. 2011; Wang et al. 2014); economic policy background (Chen and Liu 2014); and its role in China's institutional, social, and economic "integration" with Hong Kong (see, for instance, Shen 2014; Ye and Huang 2014; Lorne et al. 2017).

As a former British colony and international financial centre, Hong Kong as a common law jurisdiction has been guaranteed a degree of autonomy under China's "One Country, Two Systems"

national policy, which, as envisaged in the Sino-British Agreement of 1984 Regarding the Future of Hong Kong after 1997, has significant international policy value.

The model in **Figure 1** explicitly informs on a social cost story, but is incomplete without examining the potential of the reclamation as a platform for Schumpeterian experimentation (Yu et al. 2000, Lai and Lorne 2006; Lai et al 2019) not only in terms of marginal urban growth, but also in the institutional expansion of the "One Country, Two Systems" idea, which involves possible shifts in D.

Small is beautiful. A smaller reclamation as a platform for experimentation is ideal, as it can avoid major blunders due to scale effects. The development of a smaller area under the complete control of a central government can bypass many vested interests (Lai, Lorne and Lu 2014) and should incur lower transaction costs of learning and experimenting (i.e., averting and revising environmental and institutional errors).

It must be stressed that Qianhai is not about a greater quantity of office land *anywhere* in Shenzhen. It is about the choice between land within the city or a prime location which is at its periphery. The

city government has no problems at all dealing with physical constraints posed by openning up hilly lands or reclaiming the sea within its jurisdictional limits but does face gigantic transaction costs of using occupied land within the city. As explained by Lai, Lorne and Lu (2014), there was not enough suitable land in the area and that being the main reason for reclamation. The paper also pointed out that reclamation was a way to break the institutional barriers posed by vested interests.

That China's property rights system is not subject to common law or even the rule of law does not affect the fact that powerful interests can fetter with the freedom of choice for a local government. Here, the saving of costs consideration is in relation to the political consultative costs (a form of transaction costs) incurred by intra-marginal expansion, which requires a costly bargaining with stakeholders that have prior *de jure rights* or *de facto power* on the intra-marginal land. The absence of well-entrenched private land ownership and rule of law indeed increases the costs of political negotiation among stakeholders with de facto power. Reclamation, by contrast, minimises if not avoid such political consultative costs.

Man-made Venice and reclamations in Hong Kong are exemplary, both having "multiple packages" rather than just one core. Venice was developed as several artificial islands, each of which had evolved a specialized function. However, collectively, it formed a rational defensive system.

Hong Kong saw reclamation all along the coast of its old urban cores on either side of Victoria Harbour and in the new towns outside the old cores. Singapore seems to have followed a similar approach by focusing on expanding its outlying islands and building artificial ones.

Qianhai is one of three reclamation projects that were designated at strategically well-located positions and controlled by Beijing upstream from Hong Kong in the Pearl River Delta or the so-called "Guangdong-Hong Kong-Macao Greater Bay Area."[1] (Li 2017)

Similar to Deng Xiaoping's experiment with special economic zones, Qianhai is a case of government-sponsored institutional innovation and not just a duplication of existing development initiatives. However, it is not completely "government-led".

[1] https://www.bayarea.gov.hk/en/home/index.html. Accessed 24 November 2019.

Market-driven innovations in products and institutional structures can be from the bottom up and are indeed encouraged. Also, unlike a special economic zone that involves developing new institutions for many different types of economic activity, Qianhai mainly involves *institutional innovations* in the service industry, which require much less 3-D space, but much higher quality floor area in convenient and strategically located areas. Land in these locations is usually already occupied or owned by individuals or organizations, private and public. The transaction costs of acquiring such land often far exceed those of converting the government's own wetlands (ocean) into dry land through reclamation.

V. Qianhai: History and Potential Impacts

Qianhai appeared as early as 1993 in China's administrative documents. After revisions to the early drafts on a regional development concept, completed in 1996, a document known as the *Shenzhen Municipal General System Planning (1996-2010)*《深圳市城市总体规划（1996-2010）》 was submitted and ratified by the State Council of China in 2000. Land reclamation for Qianhai commenced around 2001. It lasted for about 12 years, occurring in different stages and finally assumed its current shape around 2013.

Qianhai's total reclaimed area was estimated to be 13.78 sq. km or roughly 20% of all reclaimed land from the sea by the Shenzhen Municipality as of 2013.[2]

On 31 December 2014, with the approval of the State Council, Qianhai and Shekou together became an experimental area of the Guangdong Province Free Trade Zones (FTZs). (See **Figure 2** for a distribution of the various FTZs in the Pearl River Delta.) Hong Kong is also shown on this map, but is not considered a part of the Pearl River Delta administration in China. Instead, Hong Kong currently operates as a "Special Administrative Region" (SAR) of China under a *Basic Law* that follows the "One Country, Two Systems" arrangement adopted in 1997.[3]

Figure 2 about here

Figure 2: Free Trade Zones (FTZ) in the Pearl River Delta
(Source: PowerPoint Presentation of Qianhai Shekou FTZ Administrative Committee to European Chamber, 18 January 2016, Authority of Qianhai 《前海管理局》)

[2] http://news.ycwb.com/2013-08/06/content_4792151.htm.

[3] The Law originated from a 1984 Sino-British Declaration on the handover of the-then British Colony to China. Hong Kong at this point still operates in terms of social and legal system as well as money supply mechanism very differently from the rest of China.

On 27 April 2015, the Shenzhen Qianhai and Shekou free trade area (FTZ) was formally established. A subset of that area was designated a "Qianhai Shenzhen-Hong Kong Modern Service Industry Cooperation Zone" (QSHCZ) with an official area of 1,492 hectares (14.92 sq. km). This Cooperation Zone (92% reclaimed land) adopted a "Manhattan of the East" focus for three of its areas: Guiwan, Liwan, and Maiwan. (Lorne and Zhao 2017) Chinese town planners consider the QSHCZ, enjoying an advantageous location and transportation, as a key component in a paradigmatic "Canton-Hong Kong modern service industry cooperation zone." (Ye and Huang 2014) The locations of these three areas relative to the FTZ are depicted in **Figure 3**, which is a magnified area of the Shenzhen Qianhai-Shekou FTZ redlined area in **Figure 2**.

Figure 3 about here

Figure 3: The Cooperation Zone within the Shenzhen Qianhai-Shekou FTZ

Source: PowerPoint Presentation of Qianhai Shekou FTZ Administrative Committee to European Chamber, 18 January 2016, Authority of Qianhai (前海管理局)

The principal leaders of the Shenzhen Municipal Government set up a FTZ Administrative Committee to implement a Qianhai vision: utilizing the successes of Hong Kong and Macao, Qianhai aims to service the Mainland and "face the world". A Guangdong/Hong Kong/Macao cooperative in the formation of this demonstration zone

will be an important trading hub for the 21st Century and embedded into a "Maritime Silk Road" concept in the strategic positioning of modern China.

It should be noted that the advantages of Qianhai at this point are potential, but have long been envisioned in a document that deals with the integration and development of the Pearl River Delta by the Central Government. Entitled *The Outline of the Plan for the Reform and Development of the Pearl River Delta (2008-2020)* 《珠江三角洲地区改革发展规划纲要（2008-2020）》, the document reveals that the concept of "One Country, Two Systems" is not a static system that is limited geographically to Hong Kong, but a dynamic, political, and economic one. This, *if successful*, will undoubtedly turn Qianhai into the hub of a megalopolis for the Pearl River Delta, whose large and small cities have rapidly-growing populations.

VI. Reflections

The major visible ecological impact of reclamation in Shenzhen as a social cost has been the loss of wetland habitat (Ren et al. 2011; Wang et al. 2014) and much has been said about its landscape design (Kin and Zhang 2010). In this respect, the Qianhai Planning Authority has been diligently addressing the issues. In a 183-page document,

entitled *The Integrated Planning of Water System for the Qianhai Shenzhen-Hong Kong Cooperation Zone, June 2013* and written before the current construction of infrastructure on the reclaimed land, the following measures regarding a "safety assurance water system" for Qianhai were found:

> …We will create a connected, integrated and coordinated municipal infrastructure monitoring and management system of by installing water environment automatic and precise monitoring instrument, building *water corridor*s monitoring center among every vital part of water system, and integrating professional monitoring systems of municipal infrastructure such as municipal corridor, weather report, flood observation, water supply, drainage, electricity supply and communication in an integrated fashion. Qianhai will also formulate a scientific decision mechanism relying on advanced technology system, such as 3S (remote sensing technology, geographic information system, global positioning system) technology, database, etc.[4] (p.173, Translated from Chinese with emphasis in italics).

There will be three *water corridors* built for the reclaimed land to divert storm and processed water, along with measures for dealing with sea level elevation due to climate change and coping with major floods, which happen once every 200 years. It is important to note that technologies of this type will be extremely costly to implement

[4] A document from Urban Planning, Land and Resource Commission of Shenzhen Municipality (深圳市规划与国土资源委员会).

for intra-marginal land expansion. The construction of such facilities will be largely a technical construction matter and not entail the type of Coasian negotiation (i.e., transaction costs) associated with intra-marginal land interests nor infringe upon other municipality jurisdictions. This vividly shows why megacity expansion through land reclamation can better handle social costs than intra-marginal land expansion.

It is important to pause to appreciate on what technology may mean in a Schumpeterian process of city building. Technology can shift both the costs and benefits of an expansion in city size. The issue, therefore, is more than just a comparison between intra-marginal and marginal expansion based on *existing construction technology and a scale expansion of city size,* but a shift in the functions of both the demand for and cost of urban expansion by reclamation.

Joseph Schumpeter brought up the idea of *creative destruction* being a characteristic of innovation, a process in which an old technology is creatively destroyed by a new technology due to competition. This aspect of bringing innovation to a new city does not exist for reclaimed lands, as there are no prior technologies, institutions or heritage to tear down. The implementation of new

technology that takes into consideration social costs does not require the breaking up of existing infrastructure that could lose quasi-rent if the infrastructure and cultural assets is prematurely destroyed. In other words, reclamation is a way for introducing Schumpeterian innovation without *creatively destroying* the *status quo*, which rely on "Coasian" bargaining to ensure optimal allocation of resources among stakeholders of the old economies, in the case under study, of Hong Kong, Shenzhen, and the various municipalities surrounding the subject reclaimed land. Another elaboration of how Schumpeter can "meet" Coase can be found in Lorne (2020).

Qianhai is expected by planners to generate an economic scale of over RMB140 billion (approximately US$20.37 billion). This scale is unlikely to be achieved through an expansion of existing technology at a larger scale. Thus, innovation must take on a very important role in this process. At this point, how this would come about is still an open question. The point of this paper is not that Qianhai is a guaranteed success, but that if there is going to be an experiment for a new city concept, there will be economic reasons to conduct it on a reclaimed land plot, as planning and implementation costs (including social costs) are likely to be less than that of intra-marginal land

expansion. Arguably, this is how a sustainable city should be developed.

Already, the concept of a smart city is being tested in many countries. Our analysis shows a number of considerations that suggest that it would be easier to implement a sustainable smart city on reclaimed land from the sea.

VII. Conclusion

Conventional economic analyses often treat the nature of the characteristics of land as *exogenous* for simplicity sake. This is adequate for agriculture, but not so much for a location-specific international financial and service centre development, not to mention that such a centre is considered institutionally pivotal in a location where intra-marginal land is almost impossible due to the existence of various interests with huge transaction cost implications.

This paper spells out that the transaction costs of reclamation along the margins of an existing urban fabric save on the transaction costs of Coasian negotiation for property rights realignment, which involves land acquisition and compensation in the hinterland while also considering vested interests that constrain the central state.

It goes beyond arguing that reclaiming a relatively small scale, coastal, and marginal piece of land has additional benefits and advantages over converting any hinterland into intra-marginal land because the former enjoys a lower level of social marginal costs. This can be seen as the result of reducing the transaction costs of experimenting and learning, such as avoiding and correcting environmental and institutional mistakes.

China's development path since 1842 has been one of experimentation as it selectively imitates, rejects, and adapts Western institutional structures and social arrangements. This paper discusses a government-sponsored institutional innovation experiment in an *almost fully built-up* city – Shenzhen – whose urbanisation is only as old as China's post-1978 economic reforms. Such experimentation needs land, which, if successful, will generate even more economic and social demand for it. In a built-up city like Shenzhen, the transaction costs of Coasian negotiation and rights realignment (including state enterprises and collectives) are much costlier than land reclamation, which is inevitable.

More importantly, this experiment, if successful, will massively increase the secular demand for more office space in the vicinity as a matter of "coopetition." Coastal Qianhai is located close to Hong Kong, which makes it "expandable," as more land can be created quickly by reclaiming in the direction towards its collaborator and rival, Hong Kong, an international financial hub. The flexibility of Qianhai's expansion should be one factor that determines how successful the experiment could be in the future. This flexibility has become all the more important at the time of finalising this paper due to US challenging China in terms of trade, technology, IP and many other matters; and a clear realignment in regional division of labour among Asian countries, which has led to an increase in vacancy rate in Shenzhen and neighbouring cities.

This exposition is not an empirical inquiry by way of positivist hypothesis testing and hence there is surely no definitive or refutable conclusion as such. Nor it is about commercial predictions about the prospect of a real estate project in terms of a quantum of office spaces. The focus of attention is on institutional factors in urban development and innovations as a case to show how Coase and Schumpeter may meet in China. This should enrich debates about strategic regional planning in a world of fleeting international politics.

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