

# A Systems Approach to Designing Urban Commons and their Sharing Practice: Case Studies in Singapore

## Working Paper

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## Introduction

In neoliberal cities characterized by the simultaneity of spatial enclosures (Hodkinson, 2012), and an increasingly curtailed system of public amenities, the urban commons has become increasingly appealing. Despite the ascendancy of the urban commons, however, little knowledge exists on how to *design* it. Harvey (2012) suggests that urban commons can be produced, organized, used and appropriated. But none of these practical activities suggest any knowledge on how to design it even though each activity presumes that the urban commons *has been designed*.

This puzzle is further exacerbated by architectural theorist, Stavros Stavrides's (2016) suggestion that while inventive architectural solutions could surely contribute to the creation of the urban commons, architectural solutions *alone* cannot guarantee that the designed spaces will become an urban commons. Like Harvey, Stavrides assumes that some kind of design is presupposed in any urban commons. But unlike Harvey, Stavrides here goes on to show that relying on only a singular form of design—architectural design—may be necessary but is however insufficient.

This in some ways corroborates with Kip *et al.*'s (2015) conceptualisation of the urban commons, which mainly comprises of three elements, namely the resources collectively owned, shared and managed by a community, members of the community and a set of rules and/or norms that govern the usage of resources and the process of commoning. In this sense, Stavrides's remarks seem to suggest that the Systems Approach (see Churchman, 1968), where design operates on multiple scales and also interrelated systems and sub-systems, may be germane for the design of the urban commons. The Systems Approach tends to go beyond the the goal of architecture, which is usually a built form of some kind. This larger set of systemic concerns may then increase the odds of attaining, and also sustaining, the urban commons.

In this paper, we ask the following questions. First, what are the key issues and considerations relevant to the design of urban commons that the Systems Approach is likely to reveal? And second,

how can the Systems Approach contribute to the design of urban commons, and how it is different from the usual way architects and students design?

We will first discuss the contemporary urban condition that has rendered the idea of the urban commons appealing. Following this, a framework derived from the Systems Approach for the design of urban commons will be discussed, and it will then be explained using two hypothetical schemes of a studio project. Finally, we will conclude this paper by briefly comparing the Systems Approach with other approaches to designing urban commons.

## The contemporary urban condition: need for the revival of urban commons

Increasingly, neither the state nor the market is able to adequately and efficiently address the struggles in equitable provision of urban resources. While the neoliberal policies lead the market to play a more crucial role in providing amenities and services that were once provided by the state, the market normally only serves those whose needs can be recognised by the various market forces (that is, they can be priced). This urban condition, which has been recognized in various forms especially in developed economies dominated by neoliberal governance, begs the question if there are other alternatives for the distribution of urban resources.

Moreover, in the reality of neoliberal urbanism, conflict and fragmentation along the multiple fracture lines of class, income and political affiliations have become the norm. In this way, there is very little that diverse and plural *citadins* (that is, city dwellers or residents) today share with each other. On this however, one may suggest that even within the neoliberal city, these *citadins* do share at least some form of public goods as well as non-rivalrous goods offered through the market. Nevertheless, this form of sharing is limited. Firstly, what is shared through the sharing of many spatial public goods—for instance, green parks or the sidewalk—is merely co-presence (Amin 2012); there is little bonding or bridging social capital that is being created through sharing that civil nod in recognition of the other in the city. Secondly, certain non-rivalrous goods provided by the market—for instance, paying to attend classes to improve one's skills—presuppose the ability to pay, and this reality always excludes a significant number of people who may need these goods, but cannot afford them. For these reasons, and despite certain forms of sharing, a more substantive form of sharing—sharing that can repair, restore, and reconstitute human relations in the neoliberal city—is needed.

Here, we suggest that this more substantive form of sharing is anticipated to occur in the urban commons. The urban commons presents a plausible choice for the following reasons. Firstly, the urban commons has the dual merit of necessitating some form of self-organization and self-empowerment, which is able to better match collective provision to individual needs. Secondly, the urban commons also possesses some degree of autonomy from market exchange. In other words, the urban commons simultaneously excels by being more efficient than any blanket or categorical provision by the state, and it also offers goods and services that do not exclude based on economic capabilities. Thirdly, the urban commons appears to promise an improved solidarity between people by engaging them in the various activities of *commoning*: engaging in self-reinforcing, cooperative and non-zero sum social interactions over the management of a common resource enforced by a set

of rules commonly agreed by all (see Kip et al., 2015). In this way, the urban commons, while elusive, nevertheless presents a working target for many neoliberal cities today.

If the urban commons is one of the plausible answers to the struggle of urban resources in the contemporary city, the the question on how to design the urban commons and relevant sharing practices to obtain the above-mentioned goals needs to be address next.

## The Systems Approach to designing urban commons: a framework

The Systems Approach (Churchman, 1968) was developed as a response to Churchman's recognition that the complex social systems in which we live are "far too complicated for our intellectual powers and technological capabilities to be able to really identify the central problem and determine how it should be solved, no matter what approach is used." (Churchman, 1968, xi). Acknowledging our inabilities, Churchman suggested that we should conduct a continuous and dialectical review (of the system) that "consists of a continuing debate between various attitudes of mind with respect to society" (Churchman, 1968, xi). In other words, the Systems Approach offers an effective way of thinking that allows us to ask the right questions and then make informed decisions about the system in its dynamic process from inception to operation. From this perspective, it is not unreasonable to argue that the Systems Approach still retains its relevance and is probably a plausible approach to the planning and management of the complex social systems today, of which urban commons by definition is an integral part.

Since the Systems Approach was essentially formulated based on Churchman's critiques of the conventional linear rationality of management scientists, it is perhaps useful to start from Churchman's critiques to explore the key issues relevant to the design of urban commons that the Systems Approach may reveal. Table 1 summarises Churchman's main critiques of the five basic elements (or 'considerations' in Churchman's terms) of the *scientific* systems approach, and the implications to the design of urban commons.

First, Churchman's critique repeatedly highlights the gap between anticipated objective(s) and actual performance of the system, which can be affected by different elements at different stages. It means that to bridge this gap and achieve as much as possible of the planned objective(s), a dynamic view of the system and effective performance measures that can provide prompt feedback to the management of the system should be formed and clearly identified at the onset to guide the design.

Second, Churchman pointed out that even though the rational division of the system into different task-oriented components does risk being rigid and imposing constraints, this is perhaps the only way to understand and improve the operation of the system. In order to address this drawback, the question then becomes how to establish effective communications between different components instead of creating sequestered silos. On this, Churchman's suggestion is to consider the connections between the total objective the system and the sub-objectives of its components. In other words, when conceiving a system, instead of focusing on its structure, we should begin with and prioritise thinking about its purpose and how this is linked to all its possible sub-purposes. It is the knowledge

of the relationships between purposes that then effectively guides the development of the components.

**Table 1:** Summary of Churchman's critiques of five considerations of *scientific* systems approach and its implications to the design of urban commons (source: authors)

Considerations	Churchman's critique	Implications to the design of urban commons
Objectives of the overall system	Stated objectives are often independent of the performance	Continuous review of (real) objectives; precise measure of performance
Components (with clear and measurable sub-objectives)	Separation and rigidity that constrain communication	Develop components whose objectives are integral to those of the overall system
Environment	Imposition of environment boundaries leads to poor performance	Open environment; examining what subsumed under the environment at different scales
Resources (including money, people, time and equipment)	Lack of adequate thinking of real resources, e.g. personal capability of personnel	Examine limitation of (stated) resource; strategies for better utilising resources.
Management (considerations of the above four dimensions)	Uncertainty in receiving information about system's performance and errors to initiate changes	Dynamic view of the process of the system; effective measures to monitor the performance

Third, the environment for Churchman is not simply what exists outside the system but instead also what "makes up the things and people that are 'fixed' or 'given' from the system's point of view" (Churchman 1968, 35). This not only suggests that there exists no clear-cut boundary between a system and its environment, but also indicates that both a system and its larger environment are parts of an even larger system. With respect to the design, this means that any elements related to the system, both as potentials and constraints, should be subsumed to the environment and the environment should be examined across multiple scales.

Fourth, Churchman's main critique of the resources, which are "the means that the system uses to do its job" (Churchman 1968, 37), is the gap between listed resources and those that can be utilised in reality. And this gap is usually attributed to human values. It suggests that deliberate endeavours should be made in the design of a system to anticipate possible issues such as politics, morality, religion, conflicts, etc. that may act as counterforces and 'enemies' to impede its functioning and then develop corresponding strategies to narrow the gap and improve the system.

Last, the management of the system mainly deals with setting total and sub-objectives, developing components, allocating resources and controlling the performance. This is in fact a continuous process of design that requires repeated evaluation and feedback in order to make improvements. Churchman suggested that the key to management is to obtain accurate and prompt information about the performance of the system. In this sense, it echoes the first point discussed above and means to incorporate deliberate measures to enable effective assessment of the system's performance in the design.

In short, by the Systems Approach, Churchman called for the need to stand back and to consider the system from the possibly broadest point of view and through the others' lenses. It requires

continuous efforts on reviewing the performance of the system and thinking about alternatives to make informed decisions in the planning and management. Based on the above analysis, we suggest that the following six questions should be asked as a framework to guide the design of urban commons.

- 1) What is the system (urban commons)? What are the total goals of the system (urban commons)?
- 2) What are the sub-systems of the system and their respective objectives? How justifiable? And what are the relations between the objectives of sub-systems and the total goals of the system?
- 3) What is the larger environment (related elements and other systems) in which this system is situated? What are the constraints and potentials from the environment?
- 4) What influences does this system (urban commons) have on the larger environment? Does this system (urban commons) threaten/benefit other related systems?
- 5) Who, or what, are the 'enemies' of this system (urban commons)?
- 6) What are the criteria for evaluating the performance this system (urban commons)?

## Case studies: two urban design studio projects on sharing cities

In the section, we attempt to explore how the Systems Approach, in particular the above framework is derived from the Systems Approach, can be applied to designing urban commons and how it makes the architecture and urban design different from its usual way. Since architecture and urban design has rarely incorporated systemic considerations in their processes, two hypothetical schemes of a Year 4 design studio, themed as Sharing Cities and conducted in the Department of Architecture, National University of Singapore, are employed as case studies to address the above two questions respectively.

### *Studio overview*

The architecture and urban design studio attempts to test out whether urban commons is a plausible alternative to both the state-led and market-driven approaches to the regeneration of historical urban quarters. The key question underpinning the design inquiry is what kind of urban commons can be created, based on local resources, to transform a historical neighbourhood into a socially and environmentally more sustainable one.

As shown in Figure 1, Joo Chiat, a historical urban area located close to the east coast of Singapore was selected as the site. An interesting feature of the site is that a number of well-known restaurants and cafés concentrated along the north-south Joo Chiat street in the centre of the site attract people

of different backgrounds from all over Singapore. Nevertheless, this does not mean that the area is economically vital and socially vibrant. Joo Chiat was once a hotbed for crimes and anti-social behaviours. It is however now an ordinary neighbourhood with a number of left-over amenities and open spaces, and this area now faces the pressing challenge of strengthening social cohesion. This provides an apt test bed for exploring what new urban commons can offer.

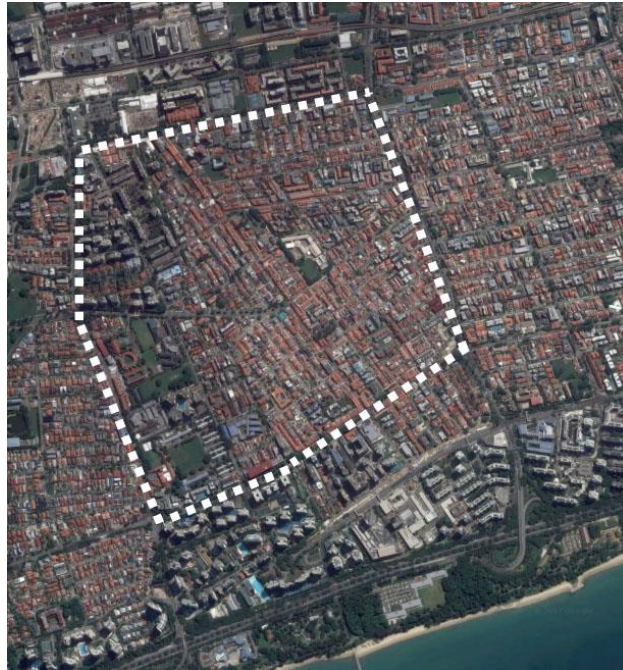


Figure 1: Joo Chiat, Singapore (source: Google Earth)

#### *Scheme one: sharing infrastructure*

The new urban commons proposed in this scheme is a sharing infrastructure system that integrates public transport, energy supply and waste management. It aims to engage all residents and use their collective efforts to build a self-sustained neighbourhood for higher social cohesion and energy efficiency.

To achieve this goal, four interrelated sub-systems with different objectives were proposed. That is, a fleet of electric self-driving cars providing shared rides within and beyond the neighbourhood to enhance local mobility, a waste management system as an integral part of the cars that collect food wastes from across the neighbourhood and transport them to an energy generator, an energy supply system that generates electricity from the food wastes to power the entire fleet of self-driving cars and a wide range of pocket public spaces across the neighbourhood, and the last one, a credit system that allows individuals to cumulate and exchange their credits gained from food waste contribution for free shared rides.

The four sub-systems are deliberately crafted as such that individual residents must make sufficient and sustained food waste contributions in order to enjoy enhanced mobility and a lively neighbourhood – an encouragement of social engagement and participation. This is then reinforced by the credit system, which is designed as a catalyst to tighten the relations between different components. A diversity of new facilities for socialising and interactions are introduced to the pockets public spaces, as illustrated in Figure 2, to further incentivise residents' participation.



Figure 2: Sharing infrastructure (source: authors)

According to the aforementioned framework, a key issue needs to be carefully examined in the design of urban commons is its relations with the larger environment. Taking the electric self-driving cars for instance, geographically their service is mainly constrained by their maximal catchment area, which is largely determined by the technologies of electric vehicle battery and the street layout of the neighbourhood. Following the design intent, potentially more destinations can be covered and more convenience and higher mobility can be attained with technological advancement. However, this then prompts a question about the impact of the system on the environment.

Using the same example, the increase of catchment area is likely to lead to the increase of demand and then the increase of supply, i.e. more self-driving cars. However, while a larger fleet can certainly improve the capacity of the sharing infrastructure, it may at the same time put more pressure on the present traffic system, causing more congestions and consequently reducing efficiency and increasing the overall energy consumption of the entire area. As such, the genuine intent of serving more residents and bringing in more convenience may turn out to be a hurdle to achieve the total goals of the system.

Following this, the operation and performance of the system may also be hindered by the users' behaviours and perceptions. For instance, on the one hand, individuals' economical and 'green' lifestyle may result in insufficient supply of food waste and subsequently the malfunction of the entire infrastructure system – an 'enemy' to the collective efforts to achieve higher energy efficiency. On the other hand, some users may be incentivised to strategically produce more food waste to earn adequate amount of credits for more free-shared rides, e.g. a restaurant owner can cumulate more credits and offer free-rides to attract more clients. In this way, the objectives of the system may be undermined by over-consumption.

Last, in view of the possible factors that may either enhance or impede the functioning of the infrastructure system, overall energy consumption of the entire neighbourhood, instead of energy generation of the system itself, was proposed as a measure of the performance of this new urban commons to guide design and management at a late stage.

### *Scheme two: sharing open education*

In the first scheme, we tried to explain how the Systems Approach can inform and support the design of urban commons. Here in the second one, we will focus on discussing how the Systems Approach make the architecture and urban design different from its usual ways.

The second scheme aims to create a shared open education platform, where a wide range of learning programmes offered by either residents or visitors who have some expertise are open to all residents including students for continuous education. In this way, the urban commons also functions as a social mixer that brings together people of different background sharing the same interests.

Similar to the first proposal, this system also comprises a tangible sub-system and an intangible one. As shown in Figure 3, the former mainly comprises a number of under-utilised public spaces across the neighbourhood, including churches, mosques, temples, gas stations, etc., and two public schools that are made partially open. Altogether these spaces offer free 'classrooms' at different times and locations for the learning programmes. And the latter is a membership system with an online platform that connects programmes to spaces and to 'students'. To maintain the urban commons, a small amount of membership fees is charged, and those who conduct a course however can sign up for other courses for free.

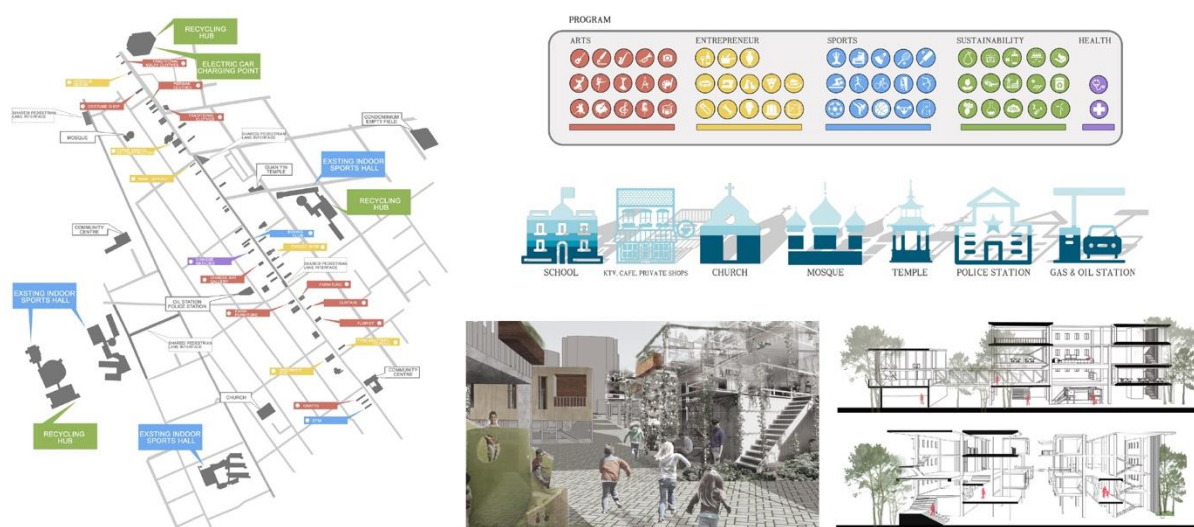


Figure 3: Sharing open education (source: authors)

One may argue at this point that the same schemes may not be inconceivable in the usual way of architectural and urban design. To develop a proposal about how to make sufficient use of public spaces is certainly not difficult for an experienced designer. And for the previous scheme, it is equally not surprising even for an architectural student to conceive the proposal of food waste recycling and power generation. However, the conscious considerations of relationships between different components and then the deliberate invention of additional components to strengthen the cohesion of the system design, i.e. the membership sub-system in the case and the credit sub-system in the previous one, may not naturally come to the designers' mind if the Systems Approach were not applied.



As stated in the framework, the Systems Approach also enables a dialectical analysis of how a system is related to, and in particular constrained by, the larger environment and how it may influence and in return be affected by human behaviours. Pertaining to this scheme, one instance is that while a diversity of not so well utilised public amenities are considered as good resources for fostering interactions among different residents, existing programs and cultural meanings of these places may turn out to be a hurdle that eliminates certain groups of people. Moreover, this new education system is inevitably in direct competition with many similar but certified private programmes, which, though much more expensive, may greatly distract people from participating in the new system due to their established reputation and broad social recognition.

**Table 2:** Considerations informed by the Systems Approach in the design of of two hypothetical schemes of urban commons (source: authors)

	<b>Sharing Infrastructure</b>	<b>Sharing Open Education</b>
<b>Systems/ Sub-systems</b>	<ul style="list-style-type: none"> <li>• A fleet of self-driving cars</li> <li>• A waste collection system as an integral part of self-driving cars</li> <li>• An energy generation &amp; distribution system</li> <li>• A credit system</li> </ul>	<ul style="list-style-type: none"> <li>• Under-utilised public spaces &amp; two schools that are partly open</li> <li>• A membership system with an online platform</li> </ul>
<b>Objective/ sub-objectives</b>	<ul style="list-style-type: none"> <li>• Self-sustained neighbourhood</li> <li>• Energy-efficiency</li> <li>• Community participation</li> <li>• Enhanced mobility</li> </ul>	<ul style="list-style-type: none"> <li>• Continuous education</li> <li>• Community engagement</li> <li>• Social inclusion</li> </ul>
<b>Constraints from the environment</b>	<ul style="list-style-type: none"> <li>• Catchment area of electric self-driving cars;</li> <li>• Primarily organic waste</li> </ul>	<ul style="list-style-type: none"> <li>• Geographical proximity;</li> <li>• Cultural meaning of public places</li> <li>• Language of courses</li> </ul>
<b>Threats to the environment</b>	<ul style="list-style-type: none"> <li>• More traffic congestions</li> <li>• Reduction of efficiency</li> <li>• Reduction of convenience</li> </ul>	<ul style="list-style-type: none"> <li>• Conflict with existing education system</li> <li>• Conflict with existing programs of some public places</li> </ul>
<b>Enemies?</b>	<ul style="list-style-type: none"> <li>• Frugality and economic lifestyle</li> <li>• Over-consumption</li> </ul>	<ul style="list-style-type: none"> <li>• Reputable teachers &amp; accredited programs;</li> <li>• Certified private programs that compete with this program</li> </ul>
<b>Criteria for evaluating the system's performance</b>	<ul style="list-style-type: none"> <li>• Overall energy consumption</li> <li>• Social capital</li> </ul>	<ul style="list-style-type: none"> <li>• Inclusivity</li> <li>• Performance of understanding</li> </ul>

Compared with the usual way of architecture and urban design, this is not to say that architects and urban designers in general have limited considerations about the broader environment in their practice. Nevertheless, the larger environment often means the general physical, economic and social conditions of the surrounding area. It has rarely been seen as including any factors and probably other systems related to the system in question. And the focus of design is usually on what resources (from the environment) can be potentially utilised for the proposal. Attention is rarely paid to anticipate possible counterforces, both from the environment and within the system itself. For this reason, 'enemies' of the system goals that are associated with human behaviours may emerge to diminish the performance and then undermine the designed system. The Systems Approach is

precisely relevant here by surfacing the system boundaries and identifying the various ‘enemies’ of the system goals.

However, it should be noted that clarifying the limitations and shortcomings of the design using the Systems Approach does not mean to turn down the scheme. And it is not possible to expect that all pitfalls can be addressed with the capacity of architecture and urban design. As Stavrides (2016) argued, architectural solutions *alone* cannot guarantee the attainment of an urban commons. In this sense, the Systems Approach offers a sharp prism, through which the design of urban commons can possibly be conceived, assessed and refined with an analytical insight on its dynamic process from inception to implementation and operation.

For reader who would like to find more details, how the Systems Approach is applied to the design of the above two schemes are summarised in table 2.

## Conclusion

In this paper, we broached the emerging topic of the urban commons and relevant sharing practice in the context of systemic design. The urban commons is not only gaining traction against the twin lapses of the state and the market, but also significantly, it represents the third idea—after The Right to the City, and the Just City movement—to wrestle back some form of citizen control on the urban process. Importantly, we discovered that the urban commons could be designed, at least conceptually, using a framework derived from the Systems Approach.

In this way, our ‘systemic design approach’ for instituting the urban commons contrasts with Foster and Iaione’s (2016) approach of creating new urban commons by relying on legal and property experimentations of derelict parcels within the inner city of North America, and is certainly different from the *beni comuni* (i.e., common goods) approach of claiming and occupying formally public and private buildings found in Italy (see Foster & Iaione, 2016). And unequivocally, our approach significantly varies with Ostrom’s (2006) cases on governing the commons of common-pool resources, which has become something of a benchmark for the various emerging proposals of the urban commons.

Instead, and in spite of its conceptual nature, our approach here is demonstrated by an architectural and urban design experiment on how to design the urban commons within the dense, bustling, developmental state of Singapore. And this experiment also provides us with an opportunity to explore the extent on how the Systems Approach can help to push the boundaries and enhance the considerations of architecture and urban design. Admittedly, our approach ultimately suffers from the reductivism that plagues all thought experiments. But this experimentation through the architectural studio pedagogy has nonetheless demonstrated the potential of how an urban commons can be designed and possibly function using the Systems Approach.

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