Xiongan Urban Vision
Multiscale data analytics for future planning of Xiongan (China) urban area

Within a team of consortium lead by Ricardo Bofill Taller de Arquitectura, Habidatum was determining possible trajectories of future development of the Xiongan city for a hundred years ahead. We collected and analyzed the external factors that may determine the evolution of Xiongan area from the zone of greenfield development through various functional types.

To analyze possible structure of urban activity in the future city of Xiongan – functional modes of various city spaces – we looked at analog cities in China and globally. Using geo-tagged data from smartphone applications as a proxy for people’s mobility, we described areas of different types: central business districts, residential districts, recreational spaces, transport hubs.

The evolution of the project area for the coming century

In order to determine possible trajectories of area’s future development, the external factors are analyzed: its various possible functional types (1) regional administrative hub, connection to Chinese Capital City Beijing; (2) link to Pacific Rim Post-Industrial Economy – connection to Tianjin; (3) Tourist Mecca – connection to Mountains and inner Mongolia; (4) Regional Agricultural Market – connection to the inland agricultural areas north of the Yellow River. All four factors presumably will be influencing the stages of the city evolution throughout the 100-year period that was taken a projection time for this project.

The idea is that the proposed master plan should take into account those key factors in order to be a space of readiness for the external change. Xiongan masterplan thus will be a physical and network system that contains and/or reflects all necessary concepts, instruments and mechanisms of adjustments.
Therefore, Xiongan urban area is located on the cross-road of two major axes: north-south (regional administrative/industrial hub (north) – regional agricultural market (south)); and east-west (tourist center (east) – high-tech center (west)). These axises will likely determine Xiongan’s future over the coming century both in terms of spatial forms and functional types (Fig. 1).

By planning the city today as a technical hub, it should be considered that on the 30 years horizon – the change of two generations and one long (Kondratieff) wave – its position in the national settlement system could change dramatically. Planned as a small city for successful technology companies and universities, it will become a large regional center with a growing population in the suburbs, and then may begin transformation into an even more multifunctional urban area integrating administrative, tourist and market functions to its high-tech profile; at least this is what we expect from the development logic of the national settlement system (Fig. 2).
Applying the multiscale approach to the analysis of various types of big data generated in the area, Habidatum searches for the optimal functional modes for the city of the future at various periods of its development. The analysis will not only look at Xiongan as a part of the national settlement system, but also explore its internal urban structure and its evolution, based on the analysis of the cities-analogues selected both in China and beyond. This comparison allows to explore the best modes of the urban space’s spatial and functional organization.

What the development trajectory means for internal structure of the city?

The predominant development of one or several axes activates the need for mixed use of land (fig. 2a). When changing development accents, the key role to sustainability and resilience of the city take on the mixed zones, which should easily change the proportion of commercial and resident functions. The possible interference between these various types of zones can be shown by the analysis of real peoples’ activity inside the city.
Adaptable internal urban structure

To analyse possible structure of urban activity in the future city of Xiongan – functional modes of various city spaces – we look at analog cities. Using geo-tagged data from smartphone applications\(^1\) as a proxy for people’s mobility, we describe areas of different types: central business districts, residential districts, recreational spaces, transport hubs.

Concept and methods

The master plan identifies several zones different in their functional specialisation. We define their possible temporal regimes based on the following characteristics: transport nodes allocation, functional zoning, distribution of infrastructure and building morphology.

- **Central business district + major transportation hub**
  The main area with the highest people’s concentrations during the working day. These rhythms are caused by working hours (morning and evening peaks), but it

\(^1\) GPS data that’s been derived from apps whose users are sharing anonymized background location data. The data is aggregated by a 100x100 meter regular grid.
may also accumulate the population in the evening depending on the district’s functional diversity. Its role is strengthened by the key transport hub.

- **Business & “night time economy” area**
  Other important centers with high concentrations of commercial functions and IT businesses. Mostly located close to transport nodes and technical infrastructure (such as data-centers). These areas attract people during the working hours, but the rhythm is slower than in CBD, employees can work on a flexible schedule/remote. The dense environment attracts more services (as well as cultural and recreational functions) and may generate evening peaks. The area may be active most of the day, does not suffer from the peak overloads.

- **Major recreational riverfront**
  Non-central space in terms of economics. A place of rest and relaxation. Peak concentrations of people in the evening, during weekends, festivals or holidays (in these days peak loads are possible). People flows are more or less evenly distributed through the capillary street network, no special transport infrastructure required.

- **Mixed pattern**
  Resilient space, the proportions of the functional mix are easily transformable depending on the demand. The most quickly reconfigurable space in case of rapid changes in functional specializations (due to technological or economic changes).

- **Quiet residential area**
  Places with the predominance of private and semi-public spaces. Residential areas with strong local communities. Usually active evenly during the daytime, in urban system are the origins of everyday people flows to business districts.

Based on the foregoing and given a basic understanding of the area’s future layout, the example of Binhai New Area (China) is analysed further where spatiotemporal regimes of the zones similar to those identified in Xiongan master plan are explored.

**Binhai New Area activity patterns: The case of central business district (CBD)**

Binhai is an emerging financial, technological and trade center near Tianjin. Binhai is developed within the same program for the development of technology centers as Xiongan. It is a fairly compact city, accumulating the development of new industries and attracting professionals from all over the country. Xiongan, being a technical hub, may replicate its activity patterns in the first 30 years after construction.
In Binhai, the activity is mostly induced by the large business district, which is located close to the large park (Fig. 3).

Figure 4 shows spatiotemporal distribution of people’s activity during the day – most of the areas with the highest concentrations are located close to the CBD and along the river, while the farthest areas are almost empty. These are residential districts – quiet quarters that do not create high concentrations of activity.

![Map of Binhai activity](image-url)

Fig. 3. Binhai people’s activity (geotagged app’s data) visualized in Chronotope™
The central business district of Binhai is the city’s main center combining administrative and financial institutions, along with leading IT companies. Its activity is determined by the office hours, nevertheless it doesn’t fade in the evening as well – life on the streets continues in cafes and restaurants.
Spatial distribution of activity in CBD is organized around a large park (fig. 6). To the east of the park it is concentrated in the offices, which at the same time create a kind of “desert” around. On the contrary, to the west the activity is concentrated along the streets in the low-rise and dense urban environment (both during the day and in the evening after the working hours). The park does not generate any activity by itself – it is a recreational area that capitalizes the nearby properties’ values and creates a pleasant contrast with the powerful concentrations of neighbouring businesses.

Fig. 6. Spatial structure of CBD activity, visualized in Chronotope™ (geotagged app’s data): two centers on different sides of the park

These examples show the dependence of the activity type on the area’s functional profile and the built-up environment. The centres described complement each other and create a diverse environment that is accompanied by a quiet rhythm of the park. Small streets next to the park activate the activity centers leading from the city bustle to the green space.

To conclude

In 30 years perspective, the whole city is going to be densely active, but the selected type of the future planning structure allows to achieve a high diversity of lifestyles, so that residents will be able to choose the preferable area, without being forced into an overly active environment. This diversity is a key parameter for social and economic resilience of the future city.