

Особенности, механизмы, вызовы и ответы пространственных отношений работа-жилье: сетевой подход

ZHANG Jining, ZHUO Jian, ZHAI Duanqiang, GAO Feiyang

Аннотация: На основе данных мобильной сигнализации Шанхая построена сеть работа-жилье, анализируются узлы, ребра и общая организация. Выявлена структура одного ядра и нескольких кластеров; расстояние и цена жилья определяют интенсивность связей. Сценарии обосновывают меры жилищной доступности и децентрализации занятости.

Ключевые слова: работа-жилье; сложная сеть; маятниковые поездки; доступность жилья; Шанхай

1 Обзор литературы

Классические показатели баланса работа-жилье недооценивают межрайонные потоки. Сетевой подход описывает пространственные единицы как узлы, а поездки как направленные ребра.

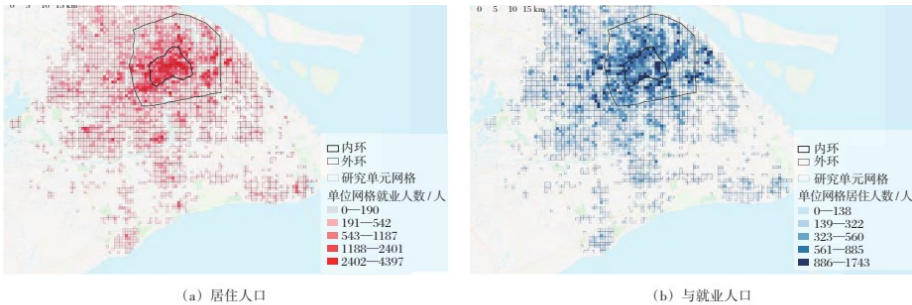


图1 居住人口与就业人口的分布特征

Рис. 1 Spatial distribution of residential and employment populations

2 Дизайн и данные

Используется сетка 1 км и данные China Unicom за октябрь 2023 г., проверенные по переписи и дополненные ценами жилья.

3.3 一主与多团: 职住网络的空间组织 随着 r 值从 1 降低到 0.1, 组团数量 形成逻辑。

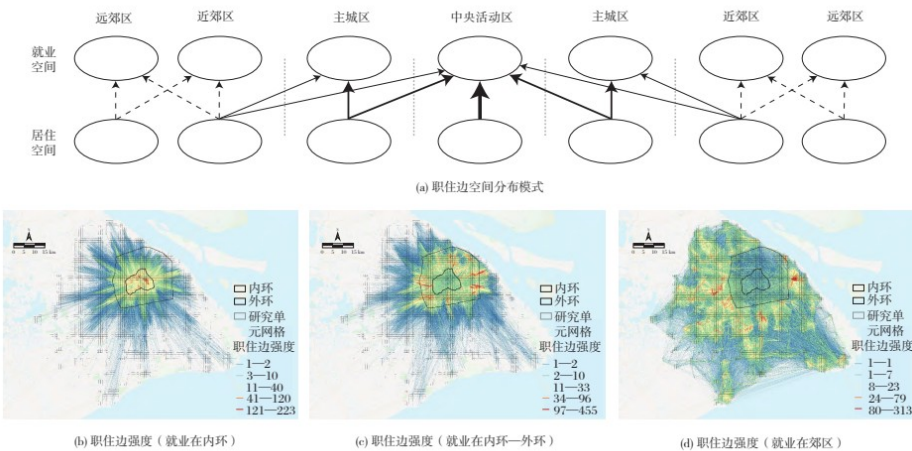


图2 上海市职住边空间分布模式及强度分布特征

Рис. 2 Spatial patterns and intensity of jobs-housing edges in Shanghai

3 Характеристики сети

Рабочие места более концентрированы, чем жилье. Ребра к центру центростремительны, а пригородные связи более локальны. Сеть образует одно ядро и несколько кластеров.

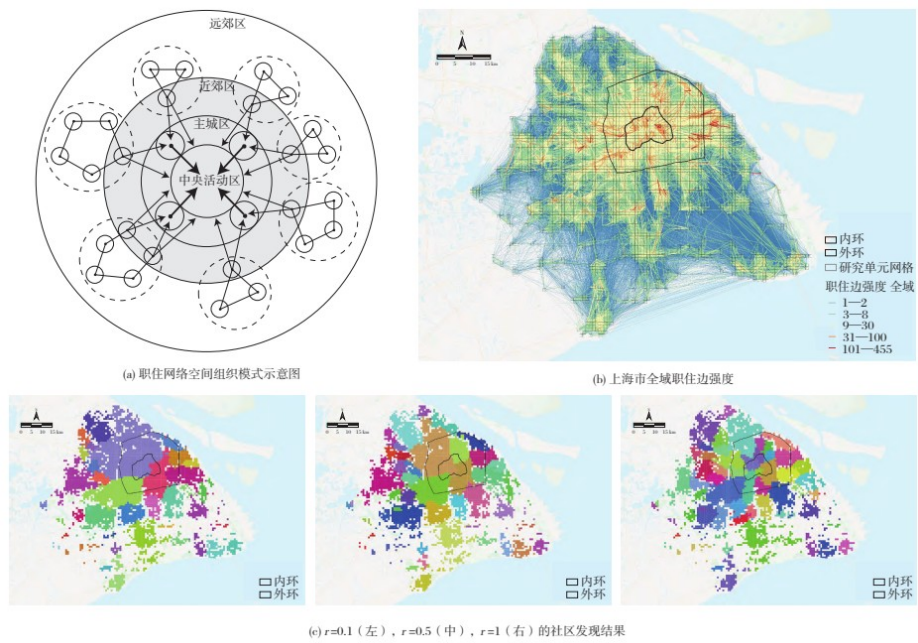


Рис. 3 Network organization, edge intensity, and community-detection results

4 Механизмы

Формирование ребер следует степенному закону. Дистанция и цена жилья снижают интенсивность связей; центральная занятость и моноцентрический ценовой градиент структурируют сеть.

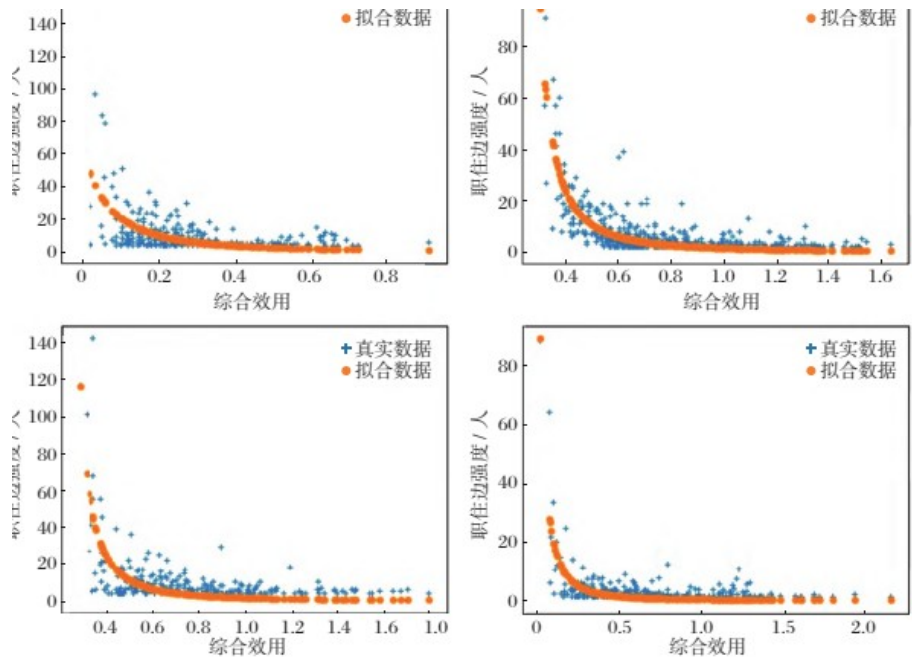


Рис. 4 Model fits for the six largest employment nodes

5 Вызовы

Основные проблемы - пространственное несоответствие, транспортные узкие места и социальное неравенство, включая временную бедность групп с низкими доходами.

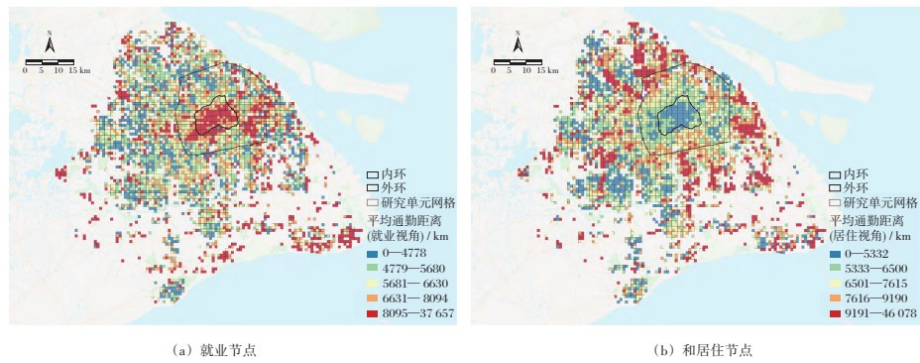


图5 就业节点（左）和居住节点（右）平均通勤距离
Fig.5 Average commuting distance of employment nodes (left) and residential nodes (right)

6 应对

不纳入场景考虑范围。

距离分布呈现出中间低、四周高的典型模式。然而，随着就业多中心化趋势的

Рис. 5 Average commuting distance of employment and residential nodes

6 Ответы

Сценарии показывают, что доступное жилье и децентрализация занятости сокращают среднюю дальность поездок и уравнивают потоки.

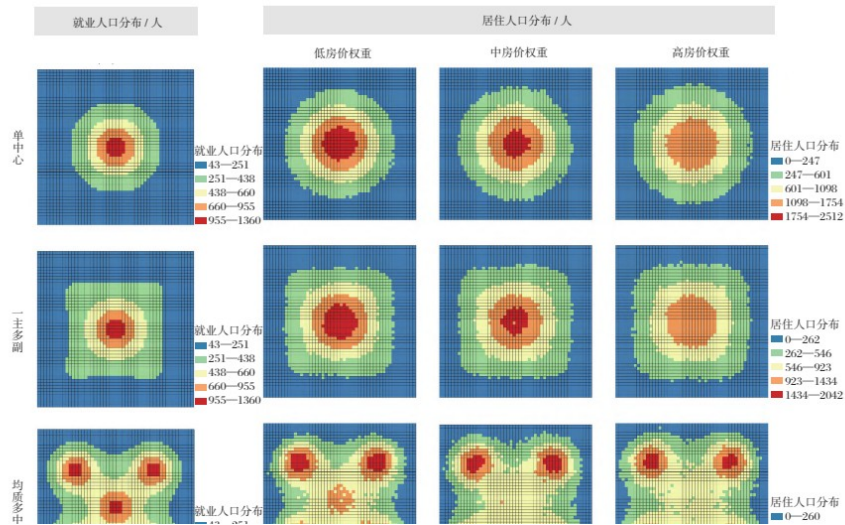


Рис. 6 Simulated employment and residential population under alternative scenarios

7 Выводы

Сетевой подход связывает форму города, жилищный рынок и занятость, предлагая инструмент для более справедливого планирования связи работа-жилье.

图6 不同场景下的就业人口、居住人口分布
Fig.6 Distributional patterns of working and residential population under different scenarios

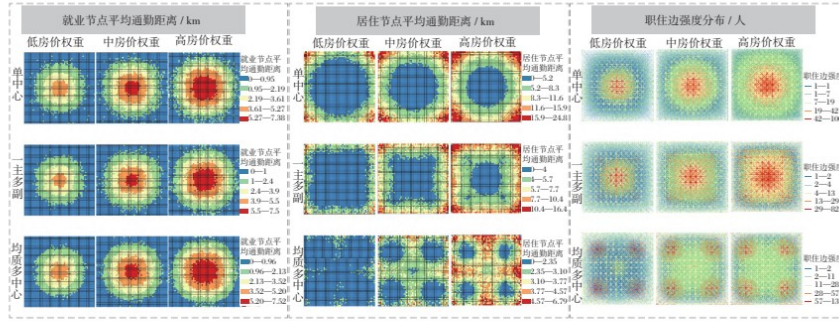


图7 不同场景下的就业节点平均通勤距离、居住节点平均通勤距离及职住边强度
Fig.7 Average commuting distances of employment nodes, residential nodes, and job-housing edge intensity under different scenarios

“一主多副”结构下那样突出。住房价格可接受程度的变化对职住网络的结构特征亦具有一定的影响。尽管这一变化不会直接导致职住网络边的结构特征发生显著改变，但其向心趋势

减弱。
6.2 应对策略
6.2.1 住房价格接受程度提升：多维度策略组合

接受程度提升能直接促进居民就近居住，减少空间平均通勤距离和减弱向心流强度。一是持续强化保障性住房体系建设。针对上海市当前情况，应进一步加大保障性住房的投资与建设力度，确保住房

Рис. 7 Average commuting distances and edge intensity under different scenarios

表1 不同场景下节点平均通勤距离的均值
Tab.1 Mean commuting distance of nodes across scenarios

场景	低房价权重		中房价权重		高房价权重	
	就业节点	居住节点	就业节点	居住节点	就业节点	居住节点
单中心	1.06	5.50	1.68	7.16	2.26	8.26

Таблица 1 Mean node commuting distance across simulation scenarios

1. The ring-based zones are the central activity area inside the Inner Ring, the main city between the Inner and Outer rings, and suburbs outside the Outer Ring. 2. The terms central activity area, main city, and new city follow the Shanghai Master Plan (2017-2035). 3. Comprehensive node city follows the same plan.

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