Amplifying the Unseen: Ethnographic Mapping of Informal Urban Economies: Ethnographic Projections in Urban Technological Mapping

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Abstract:

Smart city governance increasingly relies on data-driven mapping systems. Despite advancements in mapping technologies, contemporary metropolises present crucial economic activities that evade conventional forms of representation. This "invisible city", as described by Batty (2018a) and Steenmans et al. (2023), refers to urban spaces characterized by marginalized communities. Among these are undocumented migrant workers who establish informal economies operating outside recognized governance and planning systems. These shadow economies constitute what Foucault (2011) describes as a "grid of specification": a significant yet unmapped layer of the urban economy that is foundational to its development, and that appears as a kind of parallel city. As Wood (2010) notes, these communities contribute to the urban socio-economic fabric in ways that remain unrecognized or formally unregulated.

To confront this condition, this research proposes an 'ethnographic projection': a theoretical framework that translates ethnographic observations of spatial practices into cartographic representation through a four-stage methodological process. The case study for this research is Tel Aviv. The city is a center for approximately 5,000 Central and West African migrants. Many of these individuals work in its hospitality sector, which generates 12.2% of the city's economy.

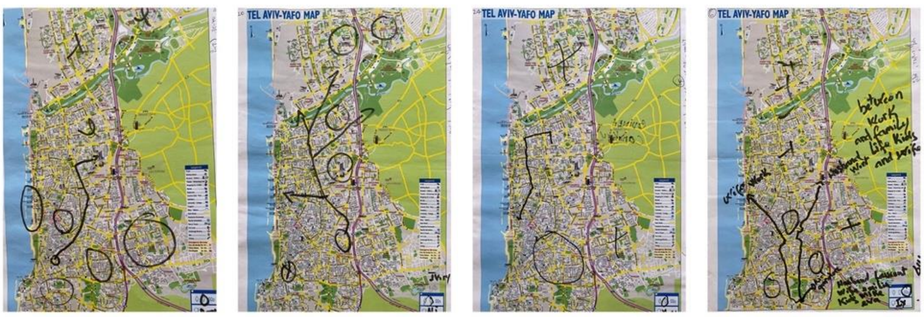

Figure 1. Example of a knowledge map marked by a participant from the migrant community, demonstrating manual marking of routes and areas in Tel Aviv. (Author's work)

The research methodology involves: (1) Ethnographic data collection through knowledge maps. In this research, 37 undocumented migrants manually marked their spatial practices on maps during six months of fieldwork, with assistance from a key informant; (2) Development of visual symbology based on Gestalt principles of proximity and similarity and creating intuitive icons for residence, workplace, movement routes, safe and unsafe areas; (3) Validation through ten in-depth interviews with community members; and (4) Digital integration in GIS using creative coding

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techniques. This framework acknowledges the complex dynamics that pushes migrants to the margins, where they develop strategies to navigate daily life while avoiding urban governance structures (Scheel and Tazzioli, 2022).

Figure 2. Symbolic modeling maps developed in Adobe Illustrator. From right to left: map of safe areas, dangerous areas, and movement routes between residence and work. (Author's work)

The technical implementation involved anchoring hand-drawn maps to ArcGIS Pro using four reference points, developing Python scripts in QGIS for visual abstraction, and creating relational tables in PostGIS that connect ethnographic data to official urban layers. Additionally, hand-drawn markings were processed in Adobe Illustrator and embedded into the GIS system as a custom symbol library. The cartographic outputs include thematic maps visualizing spatial-temporal patterns of informal labor networks, economic activity nodes, and mobility corridors. These representations maintain ethical standards through aggregation techniques and fuzzy boundaries that protect individual identities while revealing systemic patterns.

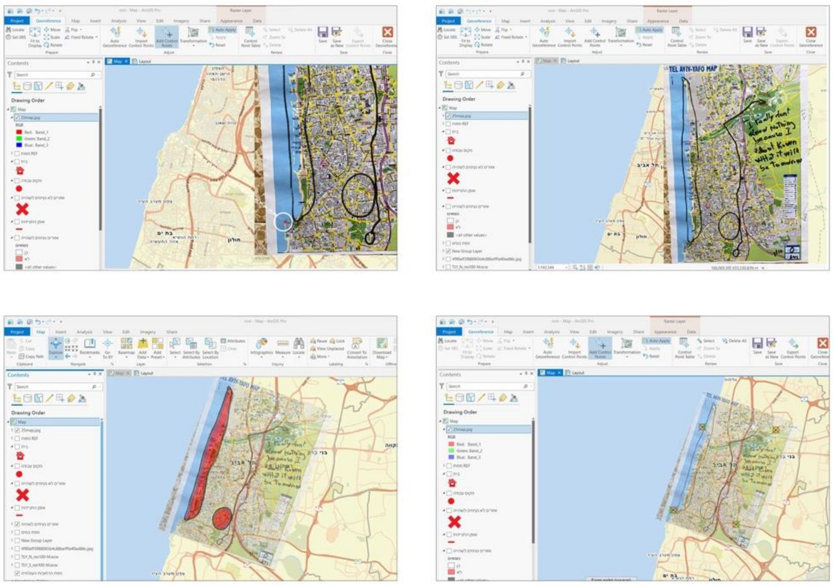

Figure 3. Process of integrating symbolic maps into ArcGIS Pro, showing different data layers and the workflow for digital analysis of ethnographic information. (Author's work)

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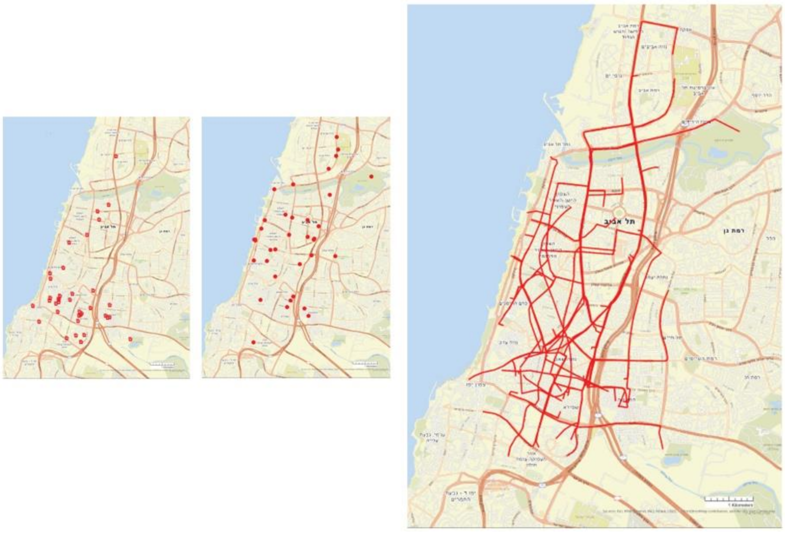

Figure 4. Final maps showing (left) migrants' residences and workplaces, (center) distribution of economic activity, (right) movement network revealing the "parallel city." (Author's work)

This design-driven approach to counter-cartography expands critical GIS methodologies by demonstrating how visual communication principles can be operationalized within geospatial frameworks to represent marginalized communities. Our research builds on the observation that the invisible city “a socio-economic-cultural ecosystem operating in parallel to the visible city” (Batty, 2018a). As Foucault (2011) suggests, such maps create a “surface of emergence” that separates subjects from phenomena attributed to them (being undocumented) by isolating their self-assessment on the map and making their presence in the city visible.

The findings contribute to smart city discourse by highlighting the importance of inclusive mapping practices that acknowledge the full spectrum of economic activities. Indeed, migrants support urban economies by filling essential low-wage positions, yet exist in an undocumented and undtaxed “shadow economy” where work is undocumented and untaxed (Cyrus, 2008; Çağlar & Schiller, 2018). This is also expressed in the collection, interpertation and processing of migrants’ data and its representation or lackthereof (Stielike, 2022) Our research addresses this critical gap by offering alternative approaches to urban data representation beyond government-aligned practices (Sandberg et al., 2022).

Beyond its theoretical contributions, this research has significant practical implications. Smart cities still exhibit a gap in addressing the “socio-technical field” of communities absent from municipal databases, such as undocumented migrant workers (Batty, 2018b). Our methodology provides a pragmatic framework that challenges representation dynamics, revealing previously obscured urban dimensions, and emphasizes potential applications. This approach can be extended to other populations and contexts, offering solutions for more inclusive urban planning, resource allocation, and policy development .

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