Chaire LOGISTICS CITY

Université Gustave Eiffel

'Warehouse Policy Index'

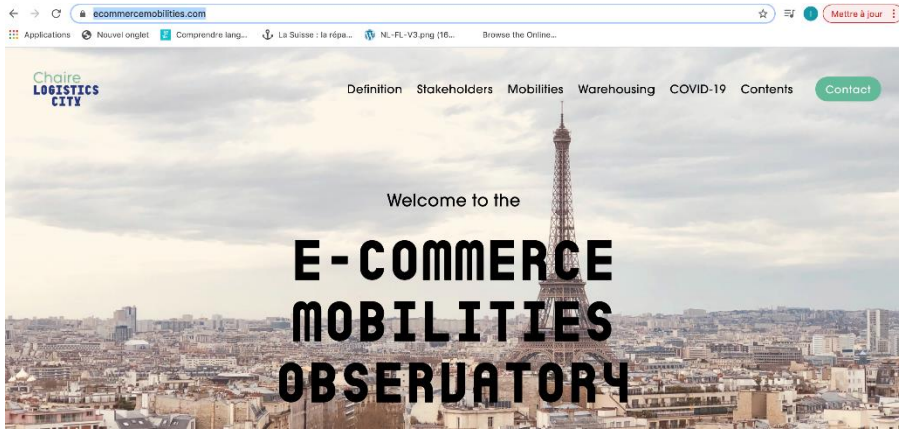
A framework for the analysis of relationships between warehousing indicators and local policy

Dr. Laetitia Dablanc

Université Gustave Eiffel

Logistics City Chair, University Gustave Eiffel, France

1. Warehouses, logistics real estate
2. E-commerce logistics
3. Public policies



https://www.lvmt.fr/chaires/logistics-city/

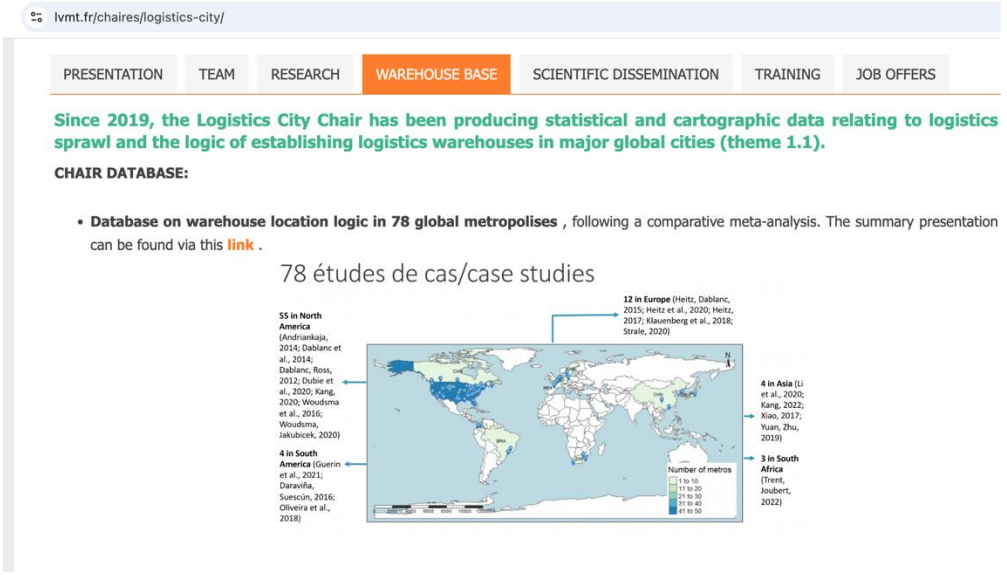
Objectives of this research

1. To look at relationships between warehouse indicators (spatial or operational) and local public policies
2. To propose a framework for calculating a Warehouse Policy Index
3. To focus on two emerging policies and their impacts on warehousing
    - 'No net land take' regulations and their impact on logistics facilities
    - The production of photovoltaic energy from logistics facilities

Part of this presentation was published in Dablanc, L., Heitz, A. (2024) Spatial patterns and investments in warehouses. Ch. 2 in Tavasszy, L., Piecyk, M., Browne, M. (Dir.) Freight transport planning. Advances in Transport Policy and Planning, Elsevier

Method

- What types of indicators are available?
  - Base Entrepôts: database of indicators from spatial analyses of warehouses (78 case studies identified in the literature, Dablanc et al., 2024)
  - **Ten indicators** selected
- How are indicators related to policy?
  - **Linking each indicator to policy**: Spatial planning, Environmental policy, and/or Economic development
  - Construction of a **Framework**
- Focus made on **two emerging policies**
- **Application to Paris and Lyon** in France (in progress), calculating each indicator and testing aggregation



Université Gustave Eiffel

Selection of ten indicators

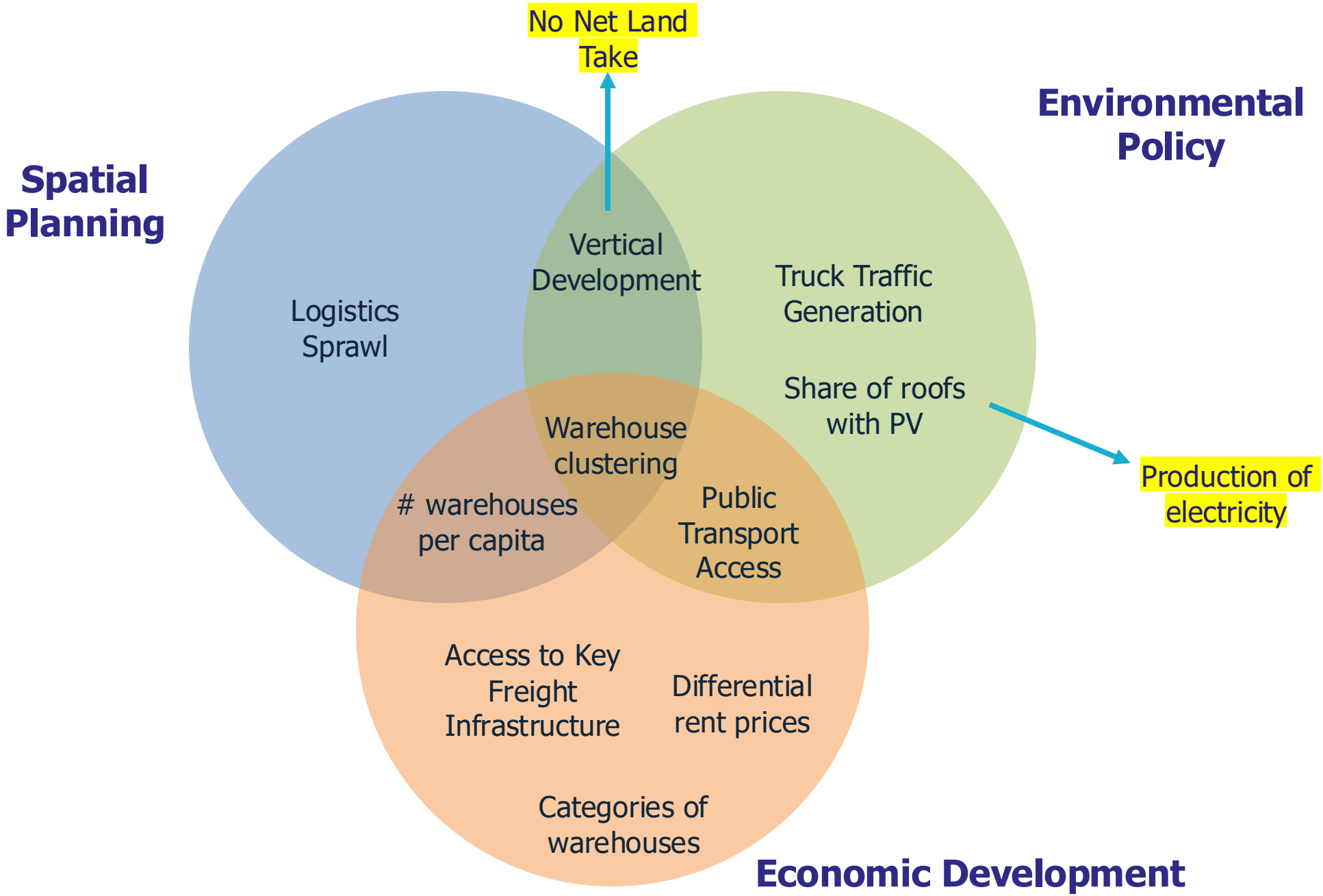
- Number of warehouses per capita
- Index of logistics sprawl (change in average distance of warehouses to their barycenter)
- Index of warehousing clustering
- Index of accessibility of warehouses to public transport (bus, train, subway stations)
- Index of accessibility of warehouses to highway entrances, key freight infrastructure and intermodal facilities
- Differential of warehouse rental prices between center and periphery
- Breakdown of warehouses per category (storage/distribution, cold)
- Index of verticality (average number of building levels)
- Truck traffic generated by warehouses in an urban region
- Share of warehouse rooftop area covered with solar panels

Relationship between indicators and public policies

INDICATOR	MEANING OF INDICATOR	POLICIES INVOLVED
Number of warehouses per capita	• Contributes to building a knowledge base for a freight or master plan diagnostic • Over a certain number of warehouses per capita (eg 1 for 10,000), city defined as a "logistics gateway" playing a logistics role that is national or international	• Spatial planning, zoning • Contributes to the integration of logistics issues into spatial planning and zoning • Being a logistics gateway can be an opportunity (economic gains and jobs come with supply chain efficiency) and a threat (additional freight trips)
Logistics sprawl (change in average distance of warehouses to their barycenter)	• Can be used to identify potential risks and mitigation strategies • eg a loss of warehouses in dense areas can increase difficulties to serve new markets and urban logistics services (cycle-logistics, circular economy) • LS ratio compared with "residential sprawl" (decentralization of homes) and "economic sprawl" (decentralization of activities): if LS higher than economic and residential sprawls, potentially longer delivery routes	• Transportation planning, spatial planning • Awareness on the need to reduce truck traffic, leading to policies such as road pricing • Potential sign of overconsumption of land for warehouses, leading to policies such as "zero net land take" and logistics clustering ("freight villages")

Accessibility of warehouses to public transport	• Can reduce the use of cars by warehouse workers, improve service and working conditions, increase attractivity of logistics jobs for young workers	• Planning and transportation policies and economic development policy • Access to transit can increase the attractivity of a region for logistics developers
Truck traffic generated by warehouses in an urban region	• Average number of trucks and vans in and out of a warehouse and average distances covered • Can require costly empirical surveys or company interviews • Automated collection of truck traffic data from technology	• Environmental policy • Calculating emissions from regional freight traffic generated by warehouses can serve an environmental policy
Share of warehouse roof area covered with solar panels	• Photovoltaic on warehouse roofs provides electricity for self-consumption, neighbors or to the grid • Indicator better calculated in the future with satellite imagery data analytics methods	• Environmental policy • Can represent a useful contribution to national or regional policies aiming at a transition to cleaner energy

Breakdown of warehouses per category	• Type (industrial or consumer logistics, e-commerce logistics, agriculture logistics, etc.) of WHs in a region • Subset indicator: average size of warehouses per category	• Economic development policy, benchmark with other regions • A low average size may signal lack of modern warehouses
Verticality or average number of warehouse stories	• A high number of multi-story warehouses = reduced land take • Shows architectural innovation	• Planning policy can promote verticality as a way to reduce land consumption due to logistics development
Truck traffic generated by warehouses in an urban region	• Calculating the average number of trucks and vans in and out of a warehouse and average distances	• Calculating emissions from regional freight traffic generated by warehouses can serve an environmental policy
Warehousing clustering	• Clustering of warehouses in logistics parks increases quality of services to park users and concentrates truck-miles travelled to a few corridors • Clustering provides more opportunities to use multimodal transport, reducing the use of road transport	• May indicate regional oversight over local land use decisions related to large warehouses • Can be linked to policies aimed at environmental justice.


No Net Land Take
Spatial Planning
Environmental Policy
Vertical Development
Logistics Sprawl
Truck Traffic Generation
Share of roofs with PV
Production of electricity
Warehouse clustering
warehouses per capita
Public Transport Access
Access to Key Freight Infrastructure
Differential rent prices
Categories of warehouses
Economic Development

Warehouse Policy Index framework

- Calculate the ten indicators for a city
- Grade them (1 to 4)
- Compound (or not) the grades for each policy (Spatial Planning, and/or Economic Development and/or Environmental Planning) and for all policies

Provides a general assessment of the readiness and direction of local public policies regarding logistics developments

To be used to compare cities?

Université Gustave Eiffel

New policy targets: reduced land footprint and renewable energy production

Vertical development

Amazon fullfilment center in Delaware
350,000 m2 on 70,000 m2 footprint

Solar panels on roof

Amsterdam, The Netherlands

Policy of ‘no net land take’

- Logistics = 0.78% developed land in France
- Development on greenfields reduces biodiversity and infiltration of rainwater
- 2021 EU strategy for soil protection: objective of “no net land take" by 2050
- Became a law in France with intermediate objective by 2030
  - Regional master plans identify targets for local zoning plans
- Logistics not a formal target but frequently discussed
  - Logistics development industry sees no net land take as both a threat to future developments and an opportunity to innovate
  - Innovation includes the use of industrial and retail brownfields, underused urban areas such as former parking lots or gas stations and vertical or underground logistics facilities

Regulation of the production of green energy by use of warehouses

- Warehouse rooftops seen as available surfaces for solar panels and vegetation
- Payback time of zero to 11 years (Grebski, Maryniak, 2020) for the investor
- 2022 EU initiative to accelerate use of the "vast and underutilized potential of rooftops to produce clean energy"
- **French code of construction: 30% cover (40% in 2026 and 50% in 2027) with solar panels or vegetation** of new commercial, industrial and logistics rooftops + parking facilities
    - According to industry: 50 million sq ft of warehouse rooftops could be covered between 2023 and 2028 (AFILOG, 2023)
- Aligns with industry's long term objectives of reduction of energy costs while in the short-term introduces architectural constraints and costs

Conclusion

- A series of warehouse related indicators linked to local public policies
- Indicators if aggregated and graded can produce a general Warehouse Policy Index, or specialized indices focusing on Spatial planning, Economic development or Environmental planning including emerging policies such as no net land take or electricity production
- The Warehouse Policy Index can indicate the readiness, direction or performance of a local policy and provide elements for comparisons
- Application on Paris and Lyon in France (on going)

Ressources

- Dablanc, L., Heitz, A. (2024) Spatial patterns and investments in warehouses. Ch. 2 in Tavasszy, L., Piecyk, M., Browne, M. (Dir.) Freight transport planning. Collection Advances in Transport Policy and Planning, Elsevier
- Dablanc, L., Schorung, M., de Oliveira, R., Palacios, L., de Oliveira, L., Yaghi, P. (2024) Locational patterns of warehouses in 78 cities around the world, a comparative meta-analysis. Available from: https://www.lvmt.fr/wp-content/uploads/2019/10/Dablanc-Schorung-De-Oliveira-Palacios-Arguello-De-Oliveira-Presentation-synthetique-update-2024.pdf
- CHAIRE LOGISTICS CITY: https://www.lvmt.fr/chaires/logistics-city/

Acknowledgements

- Logistics City Chair sponsors
- Metrofreight/VREF

Université Gustave Eiffel

laetitia.dablanc@univ-eiffel.fr

Université Gustave Eiffel