Lexicon

FRESH consortium

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Introduction

This lexicon is an output of the FRESH project: The FREight-SHopping nexus in urban outskirts and beyond.

The lexicon was developed through a structured and iterative process to ensure a comprehensive and coherent set of terms relevant to contemporary urban freight and mobility planning, linked to the FRESH project. We began by identifying five thematic areas that capture the breadth of concepts related to urban mobility and freight systems: General Terminology, Urban Logistics and Freight, Travel and Shopping Behaviour, Transport Modelling, and the 15-Minute City Concept.

For each section, we compiled terms that are commonly used and conceptually important within their respective domains. This process was guided by expert insights, analysis of relevant documents, and existing glossaries from related fields. The goal was to capture both foundational and emerging terminology in a way that reflects current usage in urban transport research and practice.

We validated these definitions by comparing them with established planning and modelling frameworks and refined them further based on feedback from subject-matter experts (experts in our team and academic advisory board – (Heleen Buldeo Rai, Eleonora Morganti, Orit Rotem)). We hope that this lexicon serves as a practical resource for academics, professionals, and policymakers working in urban mobility and freight planning, as much as it increased internal project understanding. This document is organized as follows:

1. General terminology
2. Urban logistics and freight
3. Travel and shopping behaviour
4. Transport modelling
5. 15-minute City concept

1) General terminology

S. No.	Term	Definition
1.1	Active travel	Travel in which the sustained physical exertion of the traveller directly contributes to their motion. For example, walking, running, scooting, wheeling, at any pace, whatever its effect on heart rate, is active movement (Cook et al., 2022). While traditionally limited to non-motorised forms, some definitions now include light electric-assisted modes (e.g. e-bikes and e-scooters) when they involve physical effort. A reasonable ratio between cyclists' pedalling force and the assistance provided by the electric motor are decisive to active mobility and thus decisive for electric powered bicycles to be included as modes of active travel.
1.2	First and last-mile (passenger transport vs logistics)	In passenger transport research, first-mile and last-mile access typically refers to the accessibility of the initial and final segments of a trip to and from public transport, encompassing the ease with which passengers can reach transit stops and their destinations from those stops (Sogbe et al., 2024). While for logistics, first and last mile delivery stands for freight transport logistics over the first and the last part of the way to the customer, respectively. The first mile is the movement of goods from the point of origin (such as manufacturer or supplier) to a central distribution or transit hub. The last-mile is the final leg in the delivery process, typically involving the transport of goods from a hub to the end customer, be it an establishment (store, office building, etc.) or a consumer home (Macioszek, 2018; Motavallian, 2019).
1.3	First- and last-mile-problem/burden (passenger transport vs logistics)	In passenger transport research, the first- and last-mile (FLM) problem is the lack of adequate connectivity between transit stations and trip origins/destinations (Lu et al., 2024). In logistics research, first- and last-mile burden refers to the costs, complexities, and inefficiencies of the two ends of the supply chain. These segments are often the most logistically complex and cost-intensive due to fragmented shipments, dispersed delivery points, and the need for high service quality in dense urban areas (Macioszek, 2018).
1.4	Traffic (flow)	Traffic flow refers to the movement and interactions of individual drivers and vehicles between two points, as well as the composition of traffic and the proportion of different types of vehicles.
1.5	Mobility	The term "mobility" – from the Latin mobilitas or mobilis – denotes the potential for movability or "the state of being moveable" (Götz, 2023). Mobility refers to the ability of people, goods, and services to move freely, efficiently, and safely across a geographic area using available transport infrastructure and services.
1.6	Modal split	In passenger transport research, the term "modal split" refers to the distribution of travel or transport choices of passengers among different modes, like walking, cycling, public transport, or private vehicles (Götz, 2023), i.e. the distribution of the passenger trips. In logistics research, modal split also refers to the distribution of transport choices among modes, especially walking, cycling, motorcycling, road (trucks and vans

		especially), rail, waterways, and a combination of these modes (intermodality). Here, however, the reference is to freight trips, and to the choices made by logistic operators.
1.7	Modal shift	A change from one mode on another. Depending on the level of analysis it can refer to a change in modal split (aggregate level), or a change of mode for one leg (intermodality).
1.8	Transport system	The combination of elements and their interactions, which produce the demand for travel within a given area and the supply of transport services to satisfy this demand (Cascetta, 2001).
1.9	Resilient transport	The ability of transport infrastructure and services to absorb, recover from, and adapt to disruptions such as natural disasters or demand shocks. There are two important aspects to the resilience of transport systems: robustness and rapidity (ITF, 2024).
1.10	Travel outcome	A "travel outcome" refers to the results or consequences of a journey, encompassing both intended and unintended effects, and can be broadly categorized into social, economic, and environmental impacts.
1.11	Travel demand management and Freight demand management	A set of strategies aimed at maximizing traveller choices. Travel demand management provides travellers, regardless of whether they drive alone, with travel choices, such as work location, route, time of travel and mode. In the broadest sense, demand management is defined as providing travellers with effective choices to improve travel reliability (FHWA, 2004). While freight demand management can be described as a set of transport policies or strategies that encourages businesses and other freight generators to change the way they create or manage freight demand. The goal is to make goods movement more efficient and productive, while also improving sustainability, reducing negative impacts on communities, and supporting a better quality of life (Holguín-Veras and Sánchez-Díaz, 2016).
1.12	Transport Efficiency	The level of effectiveness and smoothness in the transport sector of a city, where technology, planning, and management work together to ensure that citizens can move around the city in a timely and comfortable manner, without congestions or delays (Abu-Rayash and Dincer, 2020)
1.13	Willingness to pay (WTP)	WTP is defined as the net income decrease that, when a certain variable is modified, allows maintaining the same expected utility (Potoglou and Spinney, 2024) This concept is used in both passenger and freight transport. The most common application of WTP in passenger transport is to understand the value of travel time (VoTT), which is the amount of money that passengers are willing to pay (or accept) for reduction (or increase) in a unit amount of travel time (Beck et al., 2017). While in logistics, the most common application is to understand the willingness to pay for sustainable delivery options (Biancolin et al., 2025).
1.14	Consumer surplus (Consumer and producer surplus in logistics)	The consumer surplus is the sum of the differences between the willingness to pay, and the amount consumers pay for a good and/or service (Train, 2009). In travel demand analysis, the consumer surplus is defined as the difference between what the travellers are willing to pay to improve the system and what they pay in practise (Potoglou and Spinney, 2024). While for logistics, the difference between what a buyer would just be willing to pay for a commodity and its actual price is commonly termed a consumers' surplus. Similarly, the difference between the market price of a

		commodity and its marginal cost to a seller is commonly termed a producers' surplus (FHWA, 2011).
1.15	Accessibility	In passenger transport research, the term accessibility refers to the ease with which or the extent to which individuals can reach and benefit from essential urban services and functions within a defined time threshold (X-minute city), encompassing not only spatial distance but also social, economic, and infrastructural dimensions (Da Silva et al., 2020). The concept of accessibility is used in logistics as well, albeit to a lesser extent to refer to the ease and efficiency with which goods can reach their destinations, incorporating physical access to transport networks, and the cost and time required for movement. In the case of passenger transport research, accessibility is mostly defined in the terms of time, distance, and cost, the logistic research definition of accessibility also considers measures such as geography, population and economic activity of a region (Thomas et al., 2003).
1.16	Travel impedance	This refers to how travellers perceive space and the difficulty of travelling through it (Potoglou and Spinney, 2024). "Space" can be in terms of distance, time, cost, etc. While in logistics research, the network impedance to last-mile (or first-mile) is defined as the amount of resistance to traverse through a route on a road network from the pick-up to the delivery point. In addition to the commonly used parameters of distance, time, and cost, travel impedance in logistic research also considers factors such as population density, proximity to activity centres, speed limits, number of lanes, and parking facilities in a zone (Ewedairo et al., 2018).

Urban logistics, urban freight

	Term	Definition
2.1	City logistics	All freight and delivery management activities in cities that provide innovative responses to new consumer and business demands while respecting high-level social and environmental conditions (Dablanc, 2019).
2.2	Consumer logistics	Activities and decisions carried out by consumers to manage the acquisition, transport, storage, use and return of goods. It includes both physical tasks, like traveling to stores or collecting parcels, and cognitive efforts, such as scheduling deliveries or comparing options (Wang et al., 2023).
2.3	Cross-dock facilities	Logistics facilities where incoming shipments are unloaded, moved across the facility, and loaded into outbound trucks (or vans), such that truck load factor are increased and transport costs are reduced (Zenker and Boysen, 2018). Cross-dock facilities are conceptually opposed to storage facilities.
2.4	Crowd logistics	Also alternatively termed as crowd shipping, crowdsourced delivery, cargo hatching or collaborative logistics. It refers to a digitally-enabled model that connects logistics service demand with an undefined and external group of individuals (the "crowd") who possess spare transport capacity in terms of time and/or space. These individuals voluntarily participate in delivery tasks and are compensated for their contribution, forming a decentralized and flexible distribution network that complements traditional logistics systems (Buldeo Rai et al., 2017)
2.5	Curbside management for logistics	Managing "competition for space" of freight operators to access dedicated loading and unloading areas, be they public or private, on-street or off-street (Dablanc, 2021).
2.6	Daas - delivery as a service (DaaS)	A new approach based on service-oriented delivery and business processes in line with customer expectations and needs." It incorporates shared, connected and low emission transport operations to meet customer requirements responsively (Huschebeck and Leonardi, 2020).
2.7	Dark stores	Small fulfilment centres for grocery products used in the e-grocery market, called "quick commerce". Fast deliveries are made from dark stores after online orders. Dark stores act as a type of fast delivery hub (Buldeo Rai et al., 2022).
2.8	Delivery tour or tour-based freight travel	A delivery tour is a planned sequence of stops or deliveries, typically for goods or services, designed to be completed by a delivery driver or vehicle during a single trip starting and ending at a central depot or distribution point, and involves multiple deliveries or pickups along the route (Thoen et al., 2020).
2.9	Fast delivery hubs	Fulfilment centres' small variant, providing local storage and fulfilment (Buldeo Rai et al., 2022).
2.10	Freight flow	A physical expression of the economic interactions which transported from production location to other places for consumption and supplied as an intermediate or final goods (Holguín-Veras et al., 2020).
2.11	Freight generation (FG)	The amount of freight (tonnage or volume) both attracted to or produced by an establishment or aggregated to an industry sector or over a specific spatial area (Holguín-Veras et al., 2014).
2.12	Freight transport	The actual carriage of goods including their pick-up and delivery (Dablanc, 2019)

2.13	Freight trip	Unit of observation, a single vehicle movement carrying goods from one location to another point. Each trip involves a vehicle, origin, destination, time, and cargo, and it may be part of a broader delivery tour or a stand-alone point-to-point movement.
2.14	Freight trip generation (FTG)	The number of freight vehicle trips generated to transport freight by a specific land use, business, or economic activity over a period (Holguín-Veras et al., 2014).
2.15	Fulfilment centre	Centralized logistics facilities that handle storage, order picking, packaging, and outbound distribution of goods for e-commerce platforms and retail chains. These centres typically range from 8,000 m2 to over 100,000 m2, and serving as warehouse and inventory management, consolidation, cross-docking, and value-added logistics that cater both national and potentially international markets (Onstein et al., 2021).
2.16	Gig economy	Describes work environments in which companies offer short-term contracts to independent workers and commonly temporary positions (Davies, 2022). Workers are paid by "gigs" (tasks). In urban logistics, the gig economy developed together with digital delivery platforms. Delivery workers are paid for each delivery gig.
2.17	Green deliveries	Green deliveries are part of green logistics, but with a focus on cleaner transport in the delivery activities.
2.18	Green logistics	Logistics practices that aim to reduce the environmental externalities of logistics functions, which are mainly related to greenhouse gas emissions, noise and accidents in logistics operations (Dekker et al., 2012).
2.19	Instant deliveries	Instant delivery services provide on-demand delivery within maximum two hours – by either private individuals, independent contractors, or employees – by connecting consignors, couriers and consignees via a digital platform (Dablanc et al., 2017).
2.20	Last mile delivery (services)	Last mile delivery is the last transport of a consignment in a supply chain from the last dispatch point to the delivery point where the consignee receives the consignment (Motavallian, 2019).
2.21	Last mile solutions (for e-commerce)	This is often used as another word for "last mile delivery" but in the context of e-commerce: solutions that minimise the negative effects (e.g. high costs, -pollution and inefficiency) of the last mile delivery serving e-commerce markets.
2.22	Last mile urban logistics	The logistics activity involved in the last mile delivery (services) in urban areas.
2.23	Logistic facilities	Facilities that serve to consolidate and deconsolidate goods flows to support the distribution of products from producers to consumers. Their size varies from small parcel lockers and city hubs to mega distribution centres (Onstein et al., 2021).
2.24	Logistics hotel	Multiple-story, multiple-tenant, and/or multiple-activity logistics facility, usually located in urban areas (Dablanc, 2019).
2.25	Logistics Park /freight village	Usually located at the outskirts of cities, provides services for logistics companies located on the sites, such as surveillance, catering, fuelling and cleaning stations for trucks, overnight truck parking, more rarely night accommodation for drivers (Dablanc, 2021).

2.26	Low-impact last mile delivery	Urban parcel delivery methods designed to minimize environmental and societal impacts, such as carbon emissions, noise, and congestion. These methods often include the use of electric vehicles, cargo bikes, walk-based deliveries, and digital optimization tools (e.g. real-time route scheduling, consolidated drop-off points) (Moeke, 2025).
2.27	Micro-hubs	Small, localized logistics facilities located near dense urban areas used to consolidate and dispatch goods for last-mile delivery which typically less than 200m^2. Mainly, used for consolidation and deconsolidation, temporary storage or staging for local delivery, and may include mobile depots, for e.g., cargo-bike hubs (Onstein et al., 2021).
2.28	On-demand instant (fast) delivery	Also referred as 'instant deliveries' - "online orders of all sorts (from regular household items and clothing to meals and groceries) are delivered at consumers' doorsteps within ten minutes to two hours after they are placed (Buldeo Rai et al., 2022).
2.29	Out-of-home delivery solutions	Structured delivery methods in which parcels are delivered to designated non-residential locations, such as parcel lockers, pick-up points, retail stores, or click & collect, where customers can collect them at their convenience (Kawa, 2020).
2.30	Pick-up lockers or parcel lockers	Small-scale, digitally managed self-service facilities designed for a temporary storage, and retrieval and return of e-commerce parcels purchased online. They serve as a last-mile delivery solution that allows customers to collect parcels independently and flexibly, typically without direct contact with a delivery provider (Hovi and Bø, 2024) and located in high-footfall areas like urban centres, supermarkets, libraries, gas stations, or post offices (Onstein et al., 2021).
2.31	Pick-up points, or PUDOs (Pick-Up/Drop-Off points)	Parcel pick-up points are generally small, behind the counter areas. They are used as a secondary activity for a neighborhood store. Small parcels are stored for a short period of time (e.g. 2–3 days) during which customers can collect their product (Onstein et al., 2021). PUDOs are often located in stores (supermarkets), post offices, public buildings (libraries), gas stations, or other areas that generate consumer trips (Weltevreden, 2008).
2.32	Proximity logistics	Logistics facilities that are closer to where goods are used and consumed. Their specificity lies in their location, i.e., within urban areas that are dense and mixed-use, and their service area, i.e., the city itself (Buldeo Rai et al., 2022).
2.33	Quick commerce	A segment of the e-grocery market where deliveries are made very quickly after orders (10 to 30 minutes). Deliveries are made from 'dark stores', or urban grocery fulfilment facilities.
2.34	Sharing (or collaborative) economy	Emergent, hybrid model of economic activity (often in urban contexts) enabled by digital connectivity and community participation, which facilitates the shared use, access, or production of goods, services, and space with the potential to simultaneously promote sustainable consumption and production (Cohen and Muñoz, 2016).
2.35	Shipment size	Shipment size is a unit of measuring freight transport demand and refers to the size of shipment (shipment is the number of product units that are ordered, transported and delivered) (De Jong, 2015).
2.36	Sortation centres	Large sized, cross-docking facilities that serve in-bound trucks on one side and outbound on the other, that usually sort parcels bound for last-mile delivery (Fried and Goodchild, 2023).

2.37	Sustainable urban freight	Sustainable urban freight is a multidimensional process that encompasses environmentally friendly, socially inclusive and economically viable planning, management and operation of goods movement within urban areas (Golinska-Dawson and Sethanan, 2023). It includes the efficient, low-emission, and accessible collection distribution, and delivery of goods from suppliers, warehouses and retailers, etc. to consumers and businesses while minimising negative externalities such as congestion, noise, pollution, and land use conflict.
2.38	Transport operations (in urban freight)	Transport operations are coordinated processes, activities, and systems involved in the movement, handling and delivery of goods within urban areas. These operations cover first-mile, last-mile, and intra-urban movements, and include tasks executed by logistics providers, couriers, and transport companies, such as routing, loading/unloading, scheduling, consolidation, and traffic navigation.
2.39	Travel demand (in freight modelling)	Freight transport demand refers to the required volume of goods movement between different locations, which can be measured in terms of: shipments, tonnes, tonne-kilometres, vehicle trips or vehicle tours, vehicle-kilometres, and transport cost (De Jong, 2015).
2.40	Trip (in frieght modelling)	Vehicle trips or vehicle tours are measures of freight transport demand (a tour is a series of consecutive trips starting and ending at the same location, e.g. for picking up goods from several senders or for delivering to several receivers) (De Jong, 2015).
2.41	Urban consolidation centre (UCC)	Shared-use facility where goods from multiple shippers or carriers are consolidated for low-impact last-mile delivery (often using electric vehicles or cargo bikes). The main functions of this facility are cross-company consolidation, last-mile delivery optimization, and may include temporary storage and packing services (Onstein et al., 2021).
2.42	Urban distribution centre (UDC)	Medium-sized logistics centres located at the edge of urban areas, functioning as a strategic interface between regional or national logistics flows and urban delivery networks. Distribution centres act as intermediate transfer nodes, not focused only on last-mile but on bridging medium-and short-distance freight. These facilities typically range between 2,000 m^2 to 10,000 m^2, and support cross-docking, fleet management, and intermodal transfer (Onstein et al., 2021).
2.43	Water logistics (in the context of urban logistics)	Water logistics is the planning, coordination, and operation of goods movement using waterways (inland waterways, rivers, canals, ports or maritime corridors) as part of a city/urban logistics infrastructure. The target of using waterways is to relieve road congestion and reduce carbon emissions, often linking hinterlands to city centres or facilitating last-mile delivery in cities with navigable waterways (Pourmohammad-Zia and van Koningsveld, 2023).

2) Travel and shopping behaviour

3A. Travel Behaviour

S. No.	Term	Definition
3.1	Activity travel diary	A diary, i.e. a record of a specific period, often 1 day or 1 week, of all activities and travel between them. "An activity travel diary can be used to explore the implications of online shopping, as an activity travel diary offers detailed measurements of different activities" (Ding and Lu, 2017).
3.2	Attitude toward modes	An attitude is the product of the multiplication of strengths towards a belief and the evaluation of a belief. For example, the attitude towards shopping online is measured with multiple statement on beliefs such as: (i) Shopping online is … (convenient, good, environmentally friendly, etc) and (ii) It is important that shopping online is … (convenient, good, environmentally friendly, etc)
3.3	Car dependence	There are three different understandings of 'car dependence', corresponding to three levels of analysis: micro (car dependence as an attribute of individuals), macro (attribute of society and/or the built environment) and meso (attribute of particular trips, activities or practices)" (Mattioli et al., 2016). A more general definition is "car dependence as the extent to which an individual is incapable to participate in location-based activities without a car in a satisfactory way" (Cremer-Schulte et al., 2025).
3.4	Car use pattern	This refers to the structure of car usage: Describes where, how often and for which purpose a car is used.
3.5	Substitution effect	"Substitution" denotes that a physical trip to traditional stores is replaced by an online transaction (Cao, 2009). The substitution effect can mean more than just replacing a trip. The substitution effect refers to the reduction or elimination of physical travel or consumption due to alternatives like online shopping or digital services. It can involve: • Trip substitution (e.g. shopping online instead of visiting a store), or • Dematerialization (e.g. streaming music instead of buying physical CDs).
3.6	Complementarity effect	Complementarity means that e-shopping generates new demands for trips to stores. Complementary effects can take at least four forms on the basis of different shopping processes. An individual finds a product online, travels to a store to experience it, and then buys it online; an individual finds a product online and then buys it in a store; a product purchased online makes an individual travel to a store for accessories or related products; an individual orders a product online and picks it up at a satellite store (Cao, 2009). The complementarity effect can refer to how online and in-store shopping support each other, where e-shopping can lead to additional or modified physical store visits instead of replacing them.
3.7	Modification effect	Modification denotes that e-shopping does not affect the amount of physical travel to stores but changes the characteristics of trips such as mode choice, timing, and chaining (Cao, 2009).
3.8	Neutrality effect	Neutrality means that e-shopping is independent of traditional shopping. If an individual would not have bought a product if it were not available online, the

		online purchase represents an induced demand because of online information (Cao, 2009).
3.9	Demand elasticity	Elasticity of demand is a measure of market response to a change in price. Three definitions of elasticity of demand are commonly found in the literature: (1) point elasticity, (2) arc elasticity, and (3) relative change elasticity (Eilon, 1983). In the context of transport, demand elasticity can be defined as a measure of how sensitive travel or freight demand is to changes in factors like price, travel time, or service quality.
3.10	Leg/stage	Part of a trip, which is made by a specific mode. A trip can have two (or more) stages if two modes are used.
3.11	Multimodal trips	Trips that use more than one means of transport (Clifton and Muhs, 2012) i.e. they consist of multiple legs.
3.12	Travel behaviour	Travel behaviour is a multidimensional concept in which choice of mode of transport is often given most prominence, but it also includes the numbers and frequency of trips made, destination choice, trip-chaining, driving styles, car purchasing behaviour, preferences for particular routes, times of day, levels of comfort and convenience, and arrangements made between individuals in families, neighbourhoods, workplaces and other social groups (Van Acker et al., 2016).
3.13	Travel demand	The amount and type of travel people would choose under specific conditions, taking account factors such as the quality of transport options available and their prices. Transport demand refers to the amount and type of travel that people would choose under specific conditions (Litman, 2024). Often it is also used to describe all travel behaviour: trip frequency, travel distance, trip chaining, mode choice, time use, etc. (amount and type of personal travel aggregated) (Le et al., 2021).
3.14	Travel distance	The length of all trips made by a person within a certain period (e.g. a day) (FGSV, p. 25)
3.15	Mode choice	The selection for a transport mode for one trip/leg.
3.16	Travel pattern	At a higher level, a travel pattern describes the organization of travel incidences over a period of time; each pattern corresponds to a set of preferences and constraints that dictate the specific choices (Zhao et al., 2018).
3.17	Trip frequency	The number of trips made by a person over a certain period of time.
3.18	Trip purpose	Trip purpose refers to the purpose of a trip and why people travel, such as education, work, recreation, and business (Bei et al., 2023).
3.19	Trip or Journey	A one-way movement from a point of origin to a point of destination (Ortúzar and Willumsen, 2011).
3.20	Anchoring trip	A primary or substantial trip destination (McGuckin and Nakamoto, 2004).
3.21	Direct trip	A trip that travels directly between two anchor destinations, such as a trip from home to work (McGuckin and Nakamoto, 2004).
3.22	Trip chain	A series of short trips linked together between anchor destinations, such as a trip that leaves home, stops to drop a passenger, stops for coffee, and continues to work.
3.23	Intervening stop	The stops associated with chained trips (McGuckin and Nakamoto, 2004).

3.24	Tour	Total travel between two anchor destinations, such as home and work, including both direct trips and chained trips with intervening stops. Note that it is possible to have the two anchor destinations be the same location, as in a home-to-home or work-to-work tour (McGuckin and Nakamoto, 2004).
3.25	Sojourn	A short period of stay in a particular location. It usually has a purpose associated with this stay: work, study, shopping, etc. (Ortúzar and Willumsen, 2011).

3B. Shopping Behaviour

S. No.	Term	Definition
3.25	Business-to consumer purchase	Purchase made by a consumer from a business (through an online channel) (Le et al., 2021).
3.26	Car-based shopping trips	Shopping trips by car
3.27	Car-oriented shopping destination	Shopping destinations which are designed to be travelled to by car, which can make the use of other travel modes more difficult.
3.28	Consumer mobility	How consumers move and transport goods in their daily lives
3.29	Consumer-to-consumer purchase	Commerce between private individuals (e.g. eBay)
3.30	Experiential shoppers	People enjoying the process of browsing and selecting (Hoogendoorn-Lanser et al., 2019).
3.31	Multi-channel shopping (Multi-modal shopping)	People using multiple ways, i.e. online/offline shopping, for a single transaction (Hoogendoorn-Lanser et al., 2019).
3.32	Online browsing	Spending time online looking at goods that could be purchased
3.33	Online shopping	Purchase made by a customer from a business through an online channel (Le et al., 2021). The wider definitions can also include consumer-to-consumer purchases as well as the associated passenger and freight transport
3.34	(Parcel) pick up behaviour	The patterns of behaviour of individuals who retrieve the packages that have been sent to them. It also captures the factors influencing how, when, and why individuals retrieve their packages from designated locations.
3.35	Pre-purchasing behaviour	Behaviour that happens before the actual purchase: searching, reviewing products and alternatives, selecting products and vendors.
3.36	Purchase behaviour	Includes a wide selection of activities related to making a purchase, e.g. transaction, tracking status, delivery (Le et al., 2021).
3.37	Post-purchase behaviour	Includes a wide selection of activities related to shopping after shopping e.g. returning or exchanging item (Le et al., 2021).
3.38	Purchase transaction	The exchange of money (or related value coupon) for goods thereby transferring ownership and establishing a record of the exchange.
3.39	Shopping behaviour	A person's behaviour associated with buying a product or service (e.g. searching, browsing, reviewing, buying, returning, exchanging).
3.40	Shop-browsing trip	Trip to look at things that can be bought, without the intention to actually bring them home.
3.41	Shopping	In travel behaviour research shopping is used to describe an activity that has to do with the potential purchase of a product.

3.42	Shopping stages (Path to shopping)	Shopping is a complex activity that can be decomposed into several subtasks which among others include "information gathering, trial and evaluation, the transaction, getting the item to base (home), and possibly returning the item." (Le et al., 2021). These are referred to as "shopping stages". A shopping process can include, but is not limited to, product awareness, information search, product trial, transaction, distribution, and return (Mokhtarian, 2004). The multiple stages naturally enable the fragmentation of a shopping activity (Cao, 2012). Shopping stages differ between in-store or online shopping: The activities above are often place-bound and integrated when in-store shopping; When conducting online shopping, the activities tend to be more fragmented in space and time.
3.43	Shopping demand	The amount and type of shopping people would choose under specific conditions, taking into account factors such as the quality of shopping options available and their prices.
3.44	Shopping diary	Record of shopping activities in a set timeframe, which can be used to investigate a person's shopping patterns.
3.45	Shopping duration	Total time spent on shopping activities
3.46	Shopping pattern	Description of shopping over a certain timeframe. It can include frequency of visit to retail stores, store preferences, time spent for shopping and money spent for shopping.
3.47	Online-to-offline (O2O) strategy	Retail strategy to use online channels to attract customers to physical stores (Dablanc, 2018, p.177). This is also referred to as being omnichannel which means that retailers offer multiple integrated offline and online channels to their customers, while consumers use multiple offline and online channels throughout their shopping journeys (Rai et al., 2019).
3.48	Shopping travel behaviour	Travel behaviour for shopping trips (e.g. mode used to get to a store - also differing by the purpose/distance of the shopping trip) (e.g. travelling to pick-up points)
3.49	Shopping travel patterns	Description of travel for shopping purposes over a certain timeframe. It can include the frequency and timing of trips, transport modes used, preferred destinations, route choices, and behaviours such as trip-chaining
3.50	Shopping trip	A shopping trip is a journey made with the primary purpose of purchasing, collecting, or returning goods or services from physical retail outlets. This includes visiting stores to browse and buy items, pick up online orders (e.g., click-and-collect), or return previously purchased products.
3.51	Shopping trip frequency	The number of shopping trips made by a person in a specific period
3.52	Shopping/browsing tour	A tour that includes multiple shopping and/or both browsing trips
3.53	Utilitarian shoppers (Goal-oriented shoppers)	People searching for a specific product. This is when shoppers (or consumers) are looking for specific products. Utilitarian shoppers (searching for a specific product) often prefer convenience, availability of information and absence of interaction with sales representatives (Hoogendoorn-Lanser et al., 2019).

3.54	Experiential shoppers (Hedonic shoppers)	The consumer who are looking for fun in the shopping experience (Hoogendoorn-Lanser et al., 2019).

3) Transport modelling

S. No.	Term	Definition
4.1	Integrated personal and freight transport planning	Considering all urban logistics related to passenger and freight transport together as a single logistics system improves the overall efficiency (European Commission, 2007). Given different names for the same concept: - co-modality, cargo hitching, system with mixed passengers and goods, share-a-ride, integrated passenger and freight logistics, and collaborative passenger and freight transport (Cavallaro and Nocera, 2022).
4.2	Package and delivery services	Freight transport by bicycle, foot, passenger car or van, engaged in transport of goods bought online. In transport modeling, this would be represented by an OD matrix with this purpose.
4.3	Trip production	This is defined as the home end of a home-based trip or as the origin of a non-home-based trip (Ortúzar and Willumsen, 2011).
4.4	Trip attraction	This is defined as the non-home end of the home-based trip or the destination of a non-home-based trip (Ortúzar and Willumsen, 2011).
4.5	Trip generation	This is defined as the total number of trips generated by the households in a zone (Ortúzar and Willumsen, 2011).
4.6	Activity	An endeavour or interest often associated with a purpose but not necessarily linked to a fixed location. One could choose to go to shopping in different locations. In transport modeling the activity defines the purpose of trips and can be defined as “what the traveller does at the destination of a trip”.
4.7	Modelled units (stage, trip, tour, trip chain)	A stage is a continuous movement using one mode of transport, more precisely one vehicle. It includes any pure waiting (idle) times immediately before or during that movement (e.g. waiting for a bus, searching for a parking space and making parking manoeuvres) (Ortúzar and Willumsen, 2011). Synonymous with leg A trip is a continuous sequence of stages between two activities (a trip can have only one stage, for example a car trip, or more as in a multi-mode trip) (Ortúzar and Willumsen, 2011). A tour is a sequence of trips starting and ending at the same location; a trip chain is the same as a tour, but it may not end at the same location (Ortúzar and Willumsen, 2011). Sometimes synonymous with trip chain. A trip purpose is defined by the most important activity undertaken at one of the ends of the trip (Ortúzar and Willumsen, 2011).
4.8	4-step framework	This refers to the original design of transport models, in which the travellers decision was split in four choices (steps), which again was modelled as separate steps, sequentially, with results of the previous step being input to the next step. The four steps are trip production (to travel or not), trip distribution (where to travel), mode distribution (which mode to use), and route distribution (which route by chosen mode on the chosen O-D trip). Current transport models are more advanced in the demand estimation, but the cores of them are still built up around the four choices and steps.

4.9	Service trips vs. freight trips	In transport models the private trips have been modelled separately from commercial trips. The service trips in the transport models consist of the private trips, including shopping, medical appointments and errands. Freight trips are the commercial side of the transport. They are included in transport models, often as a fixed matrix.
4.10	Freight and logistics models	Models for freight transport exist, to analyse the impacts from infrastructure investments on freight transport flows, typically location of terminals, harbours etc. The resolution of freight transport models are lower than passenger transport models, and their modeling unit is tonnes, rather than traffic related units like number of trips or cars.
4.11	Agent-based model	Agent-based models take individual-based simulation a step further by considering each traveller as a unique "agent" with distinct characteristics and decision-making capabilities. These models simulate the numerous interactions among individual agents and between agents and their environment, ensuring a bottom-up approach to transport analysis. Agent-based models are particularly useful for representing complex adaptive systems and can incorporate the learning and adaptation processes of agents over time, which is crucial for understanding the effects of policy changes or infrastructure development. They are computationally more intensive, requiring more detailed data, but offer a high level of detail in terms of behavioural representation.
4.12	Activity-based model	Activity-based models are fine-grained approaches that simulate the travel patterns of individuals based on their daily activities. Instead of focusing solely on trips, ABMs consider that each trip is the outcome of an individual's decision to participate in an activity away from home. This approach computes the demand for travel as a derived demand from the demand for participating in activities, where individuals' travel decisions are affected by household composition, personal constraints, and lifestyle. These models are created using disaggregated data from travel surveys and include intricate algorithms that simulate the choice behaviour of individuals. Unlike four-step models, ABMs can more accurately capture the complexity of decision-making processes, incorporate the variability in individual behaviour over time, and reflect changes in travel demand patterns more dynamically.
4.13	Dynamic model	A dynamic model has the ability to reflect changes in demand when the supply side changes. A four-step model would be a dynamic model, while e.g. traffic management models (AIMSUN) would normally have fixed demand and only have the ability to study changes in travel times and chosen routes.
4.14	Regional transport model National transport model Urban transport model	The transport models cover smaller or larger areas depending on how it is expected to be used. Larger areas means the resolution is lower and capacity issues are not included. Smaller areas imply that there are more details, and that capacity problems are included. The problem with capacity issues is that it affects the supply side, causing delays, which again affects demand. Representing this in a transport model requires iterations towards an equilibrium, which again require more computing power and time.

4.15	Origin-Destination Matrix (OD Matrix)	A matrix summarizing travel patterns between all origin and destination zones in a study area. It is essentially a two-dimensional array of cells where rows and columns represent each of the zones in the study area. The cells of each row contain the trips originating in that zone which have as destinations the zones in the corresponding columns. The main diagonal correspond to intra-zonal trips (Ortúzar and Willumsen, 2011).
4.16	Demand model (supply)	The demand model calculates the transport demand given input data about population and transport supply. The demand is expressed as trips given by OD matrices defined by trip purpose and mode, sometimes also by time. Often, the demand is calculated for weekdays, as weekday and weekend demand is quite different. The supply side is the transport network, including public transport services and costs with using the transport system (tickets, parking, tolling) Transport supply is in the models represented by Level of Service variables, like travel time, travel distance, cost, waiting, punctuality, delays etc.
4.17	Logit model	Logit models are econometric models which are based on the assumption of utility maximisation, that consumers/individuals/travellers choose from available options the solution best for themselves, and that we are able to measure important parts of this utility via input variables. Multinomial logit models are logit models in its simpler forms, while nested logit models or hierarchical logit models are examples of more complex model designs.
4.18	Discrete choice model	Discrete choice models have choice sets which do not overlap, you choose either item A or B, not some A and some B or something in between A and B. Logit models are examples of discrete choice models.
4.19	Model segmentation	This refers to how different trips are calculated differently, using specific demand models, like longer or shorter trips. Segmentation is also used to specify groups of households or individuals who are treated differently in the demand model, like high-income and low-income groups or people with or without a discount card for public transport.
4.20	Econometric model	Econometric models are a group of models, based on statistics, which are applied to understand the link between economic factors. These models allow for the testing of hypotheses and forecasting of future trends.
4.21	Micro-simulation model	In a micro-simulation model, each car is followed from start to end with frequent updates on events. Such models are often used to study travel times through a transport system, analysing optimal signal settings or lane usage. Micro-simulation models use fixed demand matrices and focus mostly on car traffic.
4.22	Simulation (of transport demand)	Simulation is referred to as the process of using the transport model to calculate the demand based on a set of input data. This could be for the current situation, meaning the input data represents the current transport system, or for a scenario in which some of the variables have changed, representing e.g. investments or future population.

4.23	Estimation (of demand model)	Estimation refers to the process of finding parameters to the demand model, usually after the model design is decided. Input data to the estimation is revealed choices from a travel survey and Level of service data describing the supply side for all accessible choices on the supply side. The source is normally a transport assignment model.
4.24	Trip purposes	The demand is calculated for each trip purpose and only private trips. Trip purpose covers commute, education, escort (e.g. bringing or picking someone up), shopping, leisure and business.
4.25	Stated preference (SP) data	SP data are data collected in experimental or survey situations where respondents are presented with hypothetical choice situations. The term refers to the fact that respondents state what their choices would be in the hypothetical choice situations (Train, 2009).
4.26	Revealed preference (RP) data	RP data relates to people's actual choices in real-world situations. These data are so called because people reveal their tastes, or preferences, through the choice they make in real world (Train, 2009).
4.27	Value of time (VoT)	The cost that the consumers are willing to pay to save travel time (Potoglou and Spinney, 2024).

4) 15-Minute City concept

S. No.	Term	Definition
5.1	"15-Minute city"	An urban planning concept focused on providing residents access to essential services, such as work, education, commerce, and leisure, within a 15-minute walk or bicycle from their homes, thereby reducing the need for motorized transport (Moreno et al., 2021)
5.2	Access equity	Refers to social justice and equity-related issues to various urban functions in the 15-minute city concept (Guzman et al., 2021).
5.3	Population density	Density viewed in terms of people per kilometre square. The emphasis here is on the optimal density that ultimately allows sustainability pursuits to be achieved on the economics social and environmental frontiers (Moreno et al., 2021).
5.4	Digitalization	This dimension aligns closely with the Smart City concept, where services such as online shopping, cashless transactions, and virtual communications and interactions would reduce the need for commuting as some services could be delivered within the comfort of homes or offices (Moreno et al., 2021).
5.5	Dimension of 15-min city implementation	The implementation of the 15 min city concept is largely based on four (4) dimensions, namely density, proximity, diversity, and digitalization (Moreno et al., 2021)
5.6	Diversity	Diversity is viewed in this context as twofold: (i) the need for mixed-use neighbourhoods which are primary in providing a healthy mix of residential, commercial and entertainment components and (ii) diversity in culture and people (Moreno et al., 2021).
5.7	Economic sustainability in "15-min city"	By fostering local economies and proximity trade, the 15-min city is seen as stimulating economic growth within the community and reducing dependence on long and complex supply chains.
5.8	Mixed-use development	Land use combining residential, commercial, and other functions to promote vibrant, accessible neighbourhoods.
5.9	Proximity	A spatial metric used to determine the distance or time required to access essential services from one's residence, typically measured in walking or biking in 15-minute city framework (Moreno et al., 2021).
5.10	Sustainable transport policies	Policies that must be comprehensive and systematic, integrating bicycles, public transport, shared vehicles, and other forms of electric mobility (Moreno, 2024)
5.11	Transit-oriented development	Development focused on high-quality public transit hubs, and on dense residential development around them, to encourage transit use and reduce car dependency.
5.12	Walkability	A core metric in the feasibility of the 15-minute city, and a measure of how friendly and functional an area is for walking, influenced by infrastructure, connectivity, safety, and land-use diversity (Papadopoulos et al., 2023).

Acknowledgement

This project is funded through Driving Urban Transition Partnership (DUT), and specifically: German Aerospace Center (Deutsches Zentrum für Luft- und Raumfahrt (DLR)), Funding number: 01UV2453; French National Research Agency (Agence Nationale de la Recherche (ANR)), Funding number: ANR23-DUTP-0001-01; Research Council of Norway (Norges forskningsråd) Funding number: 350295. The participating Universities are ETH Zurich, TU Dortmund, Gustave Eiffel University, Norwegian University of Science and Technology.

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