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Navigating the methodological 'Bermuda Triangle' of urban freight policy planning: guidelines, literature, and practice

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Abstract

Urban freight planning too often falls short of implementation, constrained by scarce data, fragmented governance and a complex set of actors shaping city-logistics choices. This paper addresses that theory–practice gap by assessing, first (RQ1), the degree of alignment between official Sustainable Urban Logistics Plan (SULP) guidelines and the latest methodologies reported in recent literature; second (RQ2), the methods actually used by urban logistics planners and the perceived planning barriers, noting that practitioners' operationalisations are largely undocumented; and third (RQ3), the reasons underpinning convergence or divergence across guidance, scholarship and practice as revealed by interviews with planners. The study extracts and analyses recommended approaches from policy guidance and recent academic contributions, comparing them with current planning routines. It draws on semi-structured interviews with urban logistics policy planners participating in 20 metropolitan SUMPs/SULPs across 15 European Countries. By bringing together normative prescriptions, emerging methods, and firsthand practitioner insights, the analysis provides a cross-city picture of where guidance keeps pace with methodological innovation and where it lags, and it clarifies the institutional, technical, and political mechanisms that sustain this misalignment. The result is a coherent comparative framework that both tests and substantiates emerging urban freight methodologies against real-world constraints. For researchers, it delineates priority gaps meriting further inquiry; for planners and policymakers, it offers empirical evidence on the points at which SULP guidelines diverge from planning realities and where targeted refinement is most warranted. In doing so, the paper advances evidence-driven, stakeholder-centred pathways to more resilient and sustainable urban freight systems across Europe without extending beyond the approaches already circulating in guidance and the literature or beyond what practitioners report using in the field.

Keywords:SUMP; SULP; Semi-systematic review; Urban freight policy planning; Implementation gap; UFT;Stakeholder engagement

1. Introduction

Urban freight burdens European cities with heavy externalities: kerbside competition and congestion; elevated NOx, $PM_{2.5}$ and CO_2; chronic noise and accident risk; and equity concerns over exposure, access to goods, and delivery work conditions (Fried et al., 2024; Giuliano et al., 2013; Yuan, 2021). Broadly, urban freight flows account for 25% of urban CO2 emissions and roughly half of local pollutant emissions (ALICE, 2022; EEA, 2024). In particular, e-commerce fragments consignments and increases delivery frequencies. Sustained trade and just-in-time production keep gateway truck flows high, while urban densification squeezes loading space and increases residents' exposure. Without corrective action, e-commerce–related last-mile van trips and container-truck kilometres are expected to grow at least as fast as the passenger shopping travel they replace, exacerbating

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congestion and making climate-neutrality goals at the EU and global level increasingly difficult to achieve (Marcucci et al., 2023).

The EU has responded by embedding urban logistics in its mobility-planning regime. With the second Sustainable Urban Mobility Plan (SUMP) revision, ELTIS issued the Sustainable Urban Logistics Planning (SULP) topic guide, recognising urban freight as a core urban economic sector needing dedicated guidance. In the EU framework, SUMPs and their freight-focused SULPs translate climate and safety objectives into city action (Aifandopoulou & Xenou, 2019; Rupprecht Consult, 2019). Figure 1 depicts the SULP cycle; stars mark selected phases and steps.

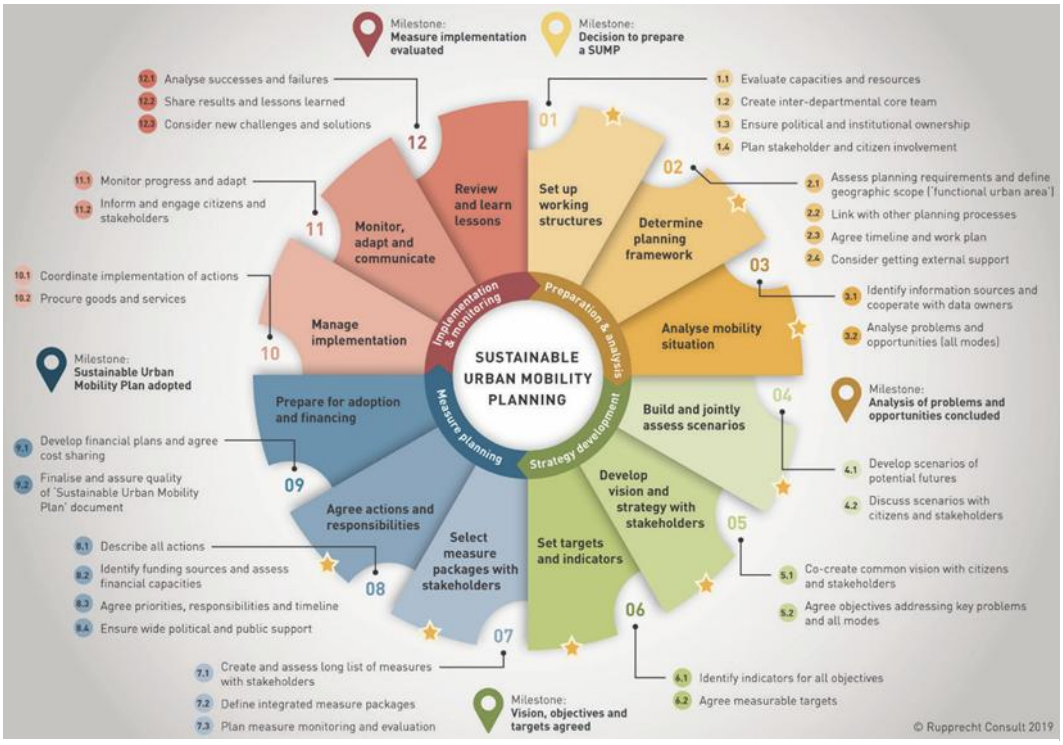

Figure 1. The ELTIS SUMP cycle. The steps marked with a star (1-8) are the ones addressed by SULP guidelines.

In Regulation (EU) 2024/1679 revising the TEN T guidelines, the EU decided that each of the urban nodes on the TEN T network must adopt and monitor a SUMP for its Functional Urban Area (FUA) by 2027. By codifying decarbonisation, demand management and electrification measures for the 431 urban nodes, these plans strengthen the policy framework that underpins the Union's pursuit of its ⩾55% net GHG reduction by 2030 and the Green Deal goal of a 90% reduction in transport emissions by 2050, even though additional measures beyond SUMPs are required to achieve these targets. The "Fit-for-55" rule-book that makes those targets enforceable (European Commission, 2021, 2019; European Parliament & Council of the European Union, 2024, 2021). The same instruments back the 2030 aim of essentially CO_2-free logistics in major urban centres and the SULP guide's pledge of "near-zero-emission urban logistics." Fleet-transition pathways align with EU CO_2 standards, setting zero g CO_2/km for all new cars and vans from 2035. SUMPs and SULPs operationalise the Horizon Europe mission to deliver 100 climate-neutral, smart cities by 2030 by linking urban mobility planning to city-wide climate contracts and by reinforcing the Climate Law's proposed 2040 economy-wide 90% GHG-reduction benchmark. (European Commission, 2020, 2019).

Academic output on SUMP and SULP development, partly funded with European support, followed swiftly. Yet a substantial implementation gap remains, and urban freight policy design still seems to be drifting within a methodological Bermuda Triangle. In this gap, research keeps refining models, evaluation protocols, and decision-support tools to promote more transparent and effective choices, but their uptake in real-world decision-making remains limited (Gatta et al., 2017). Despite a growing body of research and the availability of SULP guidelines, the operational translation of this knowledge into local SULP documents remains uneven, and much technical detail tends to be simplified in practice. Practitioners, meanwhile, default to familiar routines - traffic-count extrapolations, qualitative workshops, rudimentary cost–benefit checks - because they fit existing skills,

procurement rules, and data. Methods needing granular freight data, simulation, or politically sensitive scenario testing are seen as costly or risky and are sidelined. This three-way misalignment among scholarship, guidance, and practice arguably represents a major bottleneck in urban-freight governance.

This study advances the working hypothesis that the wider the institutional and informational distance separating those three dimensions, the larger the subsequent methodology-uptake gap and, as a consequence, the weaker the policy outcomes. To test this claim, the enquiry first compares the analytical procedures academic literature has proposed in the last decade with the methods embedded within European guidance documents. It then maps the techniques' repertoire urban-freight planners deploy and the shortcomings they perceive. Finally, it examines the facilitating and constraining elements that might account for convergence or divergence among the three spheres. In detail, the three research questions (RQs) this paper aims to address are: RQ1) To what extent do the methodological recommendations in official SULP guidelines align with the approaches recent academic literature suggests adopting?; RQ2) Which methodologies do urban logistics planners currently use, and what obstacles do they perceive as barriers to promote effective policy design?; RQ3) What explains the differences/similarities between methodological recommendations and practices urban freight planners report?. In doing so, the paper both delineates the boundaries of urban freight's Bermuda triangle and pinpoints the precise junctures where policy, practice, and academic research could converge, so that one can reframe empirical insights as possible guidance/suggestions to be incorporated into everyday planning routines.

2. Methodology

This study uses a two-stage mixed-methods design. Stage one conducts a semi-systematic literature review to bridge a fragmented evidence base spanning academic fields, EU SUMP/SULP guidance and planners' practice. A fully systematic review would exclude policy-relevant but heterogeneous sources, while an unstructured review would reduce transparency. The semi-systematic design preserves a clear search and screening protocol for replicability while allowing thematic mapping, tracking of conceptual change and integration of practitioner evidence essential to the research questions. Figure 2 reports the PRISMA flow. Figure 3 summarises the methodological workflow. The specific research query employed on Scopus is the following:

("urban logistic*" OR "city logistic*" OR "urban freight" OR "Urban Freight Transport" OR "UFT") AND ("policy planning" OR "policy-making" OR "freight policy" OR "Sustainable Urban Mobility Plan*" OR "SUMP*" OR "Sustainable Urban Logistics Plan*" OR "SULP*") AND ("Data Collection" OR "Data Gap*" OR "Data Sharing" OR "data space*" OR "data challenges" OR "data requirements" OR "modelling" OR "models" OR "data-driven polic*") AND ("stakeholder*" OR "actor*" OR "policymakers" OR "urban governance") AND (

"challenge*" OR "gap*" OR "limitation*") AND ("Rome" OR "Antwerp" OR "EU cities" OR "comparative analysis").

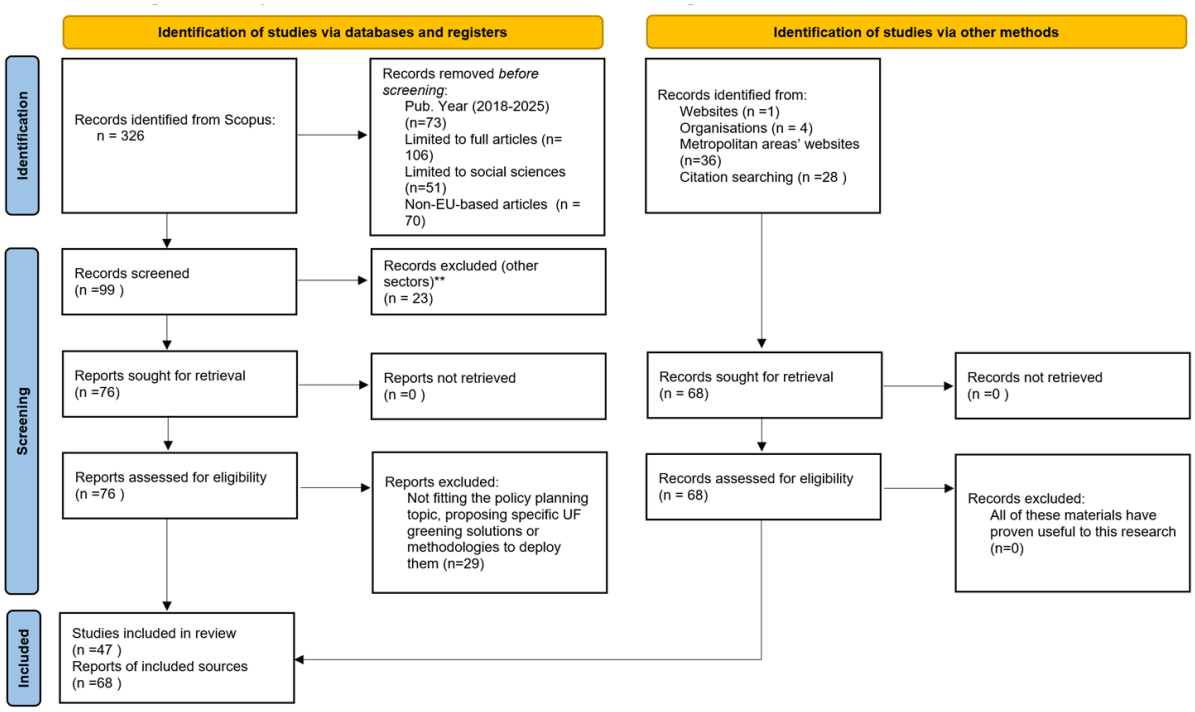

Figure 2. PRISMA 2020 flow diagram representing the semi-systematic review. Source: (Page et al., 2021)

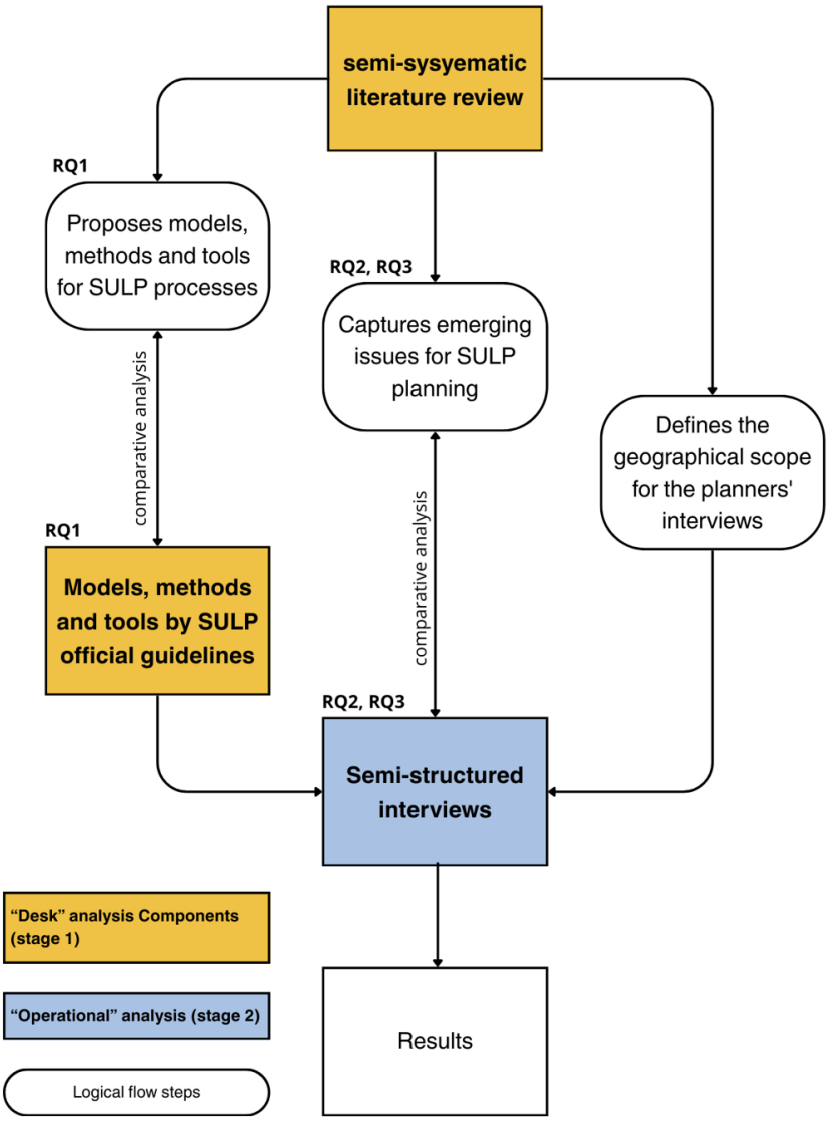

Figure 3. The methodological workflow.

The Scopus review limits results to social-science journal articles published from 2018 to 2025. It restricts the investigation to articles by authors affiliated with EU institutions, ensuring alignment with the focus on EU freight policy planning and cases. It retains studies that propose or discuss methodological innovations for urban-freight policy planning or address emerging issues in those processes. The review identifies models, methods and tools advanced for sustainable urban logistics policy planning and, against the ELTIS SULP guidelines, assesses alignment or divergence. It captures emerging policy planning issues and defines the interview geography. On this basis, the analysis consults the EU city SUMP database, integrates targeted online policy research and assesses the stage of urban-freight policy development in the cities considered.

Stage two conducts semi-structured interviews to understand urban freight planners' perspectives. This method best captures both formal and informal dynamics in a dispersed, hard-to-reach professional community. Following Albaret & Deas (2023), semi-structured interviews serve exploration, information gathering and comprehension. The design pairs interviews with the review to support triangulation and balance depth with rigour. Interview summaries are analysed with the Framework Method to enable transparent cross-case comparison in applied policy research. A concise, deductive codebook aligned with the research questions is applied and refined inductively when warranted. Charted extracts are organised in a case-by-theme matrix to preserve context and permit synthesis, including light quantification where useful, without loss of qualitative nuance (Bryman and Burgess, 2002; Gale et al., 2013).

This mixed-methods design answers the three research questions and yields findings useful to policymakers and academics.

3. Results

This section reports results from the desk and operational analyses. The desk analysis sub-section compares official SULP guidelines with academic literature on planning methodologies and then discusses the cross-phase issues. The operational analysis sub-section summarises planners' interview findings using the same comparative lens.

3.1 Desk analysis

Both the ELTIS SULP guidelines and the academic repertoire converge on evidence-based, stakeholder-centred planning. They diverge on how granular, iterative, and simulation-intensive the planning process should be. The guideline sets a three-phase planning structure (preparation and analysis, strategy development, and measure planning) that anchors freight within the SUMP frame through formal partnerships, minimum datasets, typology-based profiling, and a stepwise translation of visions into targets, indicators, and implementable packages. The literature starts from the same junction but presses for finer-grained governance design and instrumented diagnostics, so modelling effort follows dialogue maturity and yields decision-ready evidence.

In Phase 1 (Preparation & Analysis), guidelines establish robust working structures through Freight Quality Partnerships (FQPs) and Multi-Stakeholder Platforms (MSPs), secured by memoranda and data-sharing protocols. It defines scope across the FUA and profiles the city with tools such as the NOVELOG Understanding Cities tool. It then builds a diagnosis with structured observatories, freight-trip generation models, multi-scalar indicators, and calibrated simulation models. This embeds the SULP in the city's broader mobility strategy from the start, and favours comparability, institutional alignment, and analytic rigour without dictating micro-methods (Aifandopoulou, and Xenou, 2019). The literature starts from the same point yet reshapes the opening move. It stresses durable governance - a Freight Board formalised by a signed memorandum and a standing inter-institutional Task Force as the engine room - and couples this with context-sensitive evidence gathering aligned to dialogue maturity within a Complex Adaptive Systems (CAS) perspective to economise scarce analytic effort (Janjevic et al., 2019; Marciani et al., 2016; Rubini and Lucia, 2018). It also widens the institutional lens by asking planners to choose early the dedicated governance model. Furthermore, it suggests staging topic-focused dialogues that surface blind spots before roles settle while auditing EU and national rules to avoid jurisdictional traps (Rosales, 2024; Shrestha, 2024). Importantly, the literature suggests adopting a rich quantitative backbone for such planning purposes: integrated demand-modelling workflows (Lindholm and Behrends, 2012; Torrisi et al., 2020), digital twins that turn a static baseline into a live mirror (Marcucci et al., 2020), agent-based reproductions of tours, energy use, failures, and freight–passenger interaction (Calabrò et al., 2023; Comi et al., 2024, 2020; Reiffer et al., 2023), and a Local Compatibility Index (LCI) fused with a Real-Time Spatial Delphi (RTSD) allowing consensus on urban freight solutions becoming spatial, iterative, and directly exportable into scenario files (Giuffrida et al., 2024). In short, the guideline systematises the 'what' of Phase 1 - partnerships, profiling, datasets, and models - while the literature specifies the 'how' through institutional micro-design, conflict-aware facilitation, and instrumented diagnostics.

For Phase 2 (Strategy Development), the guidelines prescribe co-creative scenarios across near-, medium-, and long-term horizons, alignment of freight and passenger goals, and measurable objectives under an evaluation framework that covers impacts, socio-economic appraisal, adaptability, risk, and behaviour. Participation remains iterative and consensus-seeking, yet procedure stays linear: compare scenarios, distil a shared vision, and fix targets under a clear KPI architecture (Aifandopoulou, and Xenou, 2019). The literature keeps the destination and recasts the path as a negotiated modelling loop where politics and analytics co-evolve. Survey-weighted LCI maps feed an RTSD engine until a stabilised consensus layer identifies candidate intervention areas, along with their relative constraints (Giuffrida et al., 2024). Within a staged workflow, those constraints run through an integrated demand model that returns v/km, CO_2, costs, and reliability against thresholds negotiated in the task force; results then return to the room for scrutiny by the stakeholders who co-generated them to be discussed (Marciani et al., 2016). Advanced simulation deepens deliberation. Agent-based Models (ABM) toggle solutions and reveal tipping points, while passenger–freight interactions are replayed to avoid single-issue fixes (Calabrò et al., 2023; Reiffer et al., 2023). For this phase, adopting a stable governance typology prevents drift toward soft, unenforceable promises (Rosales, 2024). A freight digital twin functions as a living-lab projector (Gatta et al., 2017; Marcucci et al., 2020), and a stable KPI set carries from visioning to appraisal and monitoring. Thus, the guideline keeps scenario work intelligible and measurable; the literature operationalises that ambition through iterative, instrument-rich co-production.

Phase 3 ("Measure Planning") marks the gap between a programme ready for formal approval and one also engineered for continuous learning. The guideline moves from long lists to context-fit measure sets using observatories, typology tools, and measure databases such as the NOVELOG Toolkit. It then concretises each measure on an action sheet with scope, timeline, resources, and accountability. It treats governance strength as a

design variable through formal partnership agreements and stress-tests financial robustness with a City-Logistics Business-Model Canvas to filter out subsidy-dependent pilots. Web-based platforms translate stakeholder judgements into comparable metrics early, and monitoring is embedded with tailored indicators and clear data duties. Political support is sought at the end, when the package is technically sound and bankable (Aifandopoulou, and Xenou, 2019). The literature mirrors this focus on policy shaping and accountability and adds the mechanics of moving from idea to pilot. The Freight Board reconvenes to screen best practices against baseline constraints; an action matrix logs low scores next to the actor tasked to fix them (Rubini and Lucia, 2018). Recognition schemes bundle pull-type incentives into in-vivo tests under an FQP umbrella (Marciani et al., 2016). An action matrix assigns responsibilities and financing, and each measure is classified by governance mode to secure a legal basis and avoid drifting toward non-binding instruments (Janjevic et al., 2019). Spatial consensus layers distilled through RTSD are handed to decision makers as actionable sites (Giuffrida et al., 2024). The integrated demand model is rerun for each candidate bundle to return system metrics against agreed thresholds. A composite index collapses multi-criteria outputs into an ex-ante signal on portfolio advance or jeopardy, while the PROMETHEE software identifies trade-offs so the coalition can rebalance before adoption (Kiba-Janiak and Witkowski, 2019). High-resolution simulation environments - agent-based dashboards and engines, and the twin's closed reality–model loop - embed evaluation as a continuous feature. They align ex-ante Multi-Criteria Analysis (MCA) or Social Cost–Benefit Analysis (SCBA) with ex-post iterations on the same calendar, reusing indicators from baseline through appraisal to monitoring (Buldeo Rai et al., 2017; Gatta et al., 2017; Marcucci et al., 2020). The guidelines guarantee implementability, financial credibility, and embedded monitoring; the literature keeps policy packages adaptive under contention and uncertainty by tightening the link between negotiated responsibility, simulated foresight, and empirical feedback.

3.2 Operational analysis

Phase 1 (Preparation and analysis) rests on early, structured engagement, with several cases (7/20) explicitly convening FQPs, MSPs or comparable co-creation platforms that allow consultation to shape the diagnosis rather than endorse it ex post. Evidence-building starts from existing sources - municipal registers, loading/unloading inventories, traffic counts, camera/ANPR tallies, national statistics and targeted operator contacts - and is frequently complemented by stakeholder interviews (8/20) and reviews of past or ongoing pilots (5/20). Administrations integrate institutional datasets, open baseline or KPI work where feasible, and test analytical capacity: explicit baselines appear in 5/20, KPI frameworks in 4/20 and emissions tracking in 3/20, while transport-model references are present in 15/20, and toll-data inputs are noted in 2/20. Methodological depth varies substantially: detailed GIS and land-use mapping is described in 12/20, whereas only a small number report no formal scenario modelling to date (3/20). Scope is typically fixed up front by delimiting the functional area and aligning with national or ELTIS-inspired frames. Public participation ranges from online platforms (4/20) to targeted centre surveys (10/20) and, more occasionally, living-lab inputs (1/20).

In Phase 2 (Strategy development), a participatory, scenario-oriented routine builds on Phase 1 partnerships. Structured scenario work is reported in 5/20, at times paired with city-model assessments, and external analytical support is explicitly mentioned in 3/20. Strategic emphases diverge across contexts, yet operational pragmatism is visible in the attention to loading-space management and area-specific needs in central districts, sub-centres and harbour areas (10/20). Where capacity is thinner, scenario discussions proceed with lighter analytical apparatus; where stronger, they integrate datasets, maps and stakeholder feedback more systematically while maintaining consistency with EU-aligned SULP procedures.

In Phase 3 (Measure planning), cities converge on a pragmatic repertoire—curb-space management, access regulation and proximity logistics infrastructure—implemented with varying maturity and governance. Curb-space actions such as new or optimised L/U bays appear in 6/20; access-rule adjustments, including windowing and LTZ-related provisions, in 5/20; and proximity infrastructure via micro-hubs, PUDOs or lockers in 3/20. Enforcement instruments are heterogeneous, with camera/ANPR-based checks explicitly referenced in 5/20. Upstream spatial safeguards and network logistics choices are comparatively salient: 10/20 report site identification for terminals or consolidation hubs, ring-based or extra-urban siting discussions, or feasibility work for multimodal complexes. Packaging ranges from draft, consultative measures to more consolidated bundles woven into broader mobility planning.

The semi-structured interviews further clarify planners' perceived barriers and enablers. Barriers form a consistent chain from weak integration to thin enforcement and limited capacity. Data gaps are universal in the sample (20/20), integration of freight in SUMP frameworks is problematic in the majority (14/20), and coordination across stakeholders remains challenging (15/20). Guidance is at times seen as rigid or insufficiently operational (12/20), enforcement and space-management frictions are widespread (15/20), and internal resources or training bind in many administrations (13/20). On the enabling side, measurable levers coalesce around mandate, measurement and partnerships: the diffusion of camera/ANPR and related data-sharing (5/20), selective

use of toll datasets (2/20), dashboard initiatives (3/20), participatory platforms (5/20) and living-lab settings (1/20) strengthen operability; spatial instruments such as strategic land inventories or site safeguarding complement last-mile assets; and EU-scale anchoring via Urban Node/TEN-T linkages provides an additional pathway to coherence and continuity (4/20).

4. Discussion

The comparative design clarifies how far the SULP methodological canon has moved from guidance and scholarship into everyday routines, and where it still stalls. Read across the three SULP phases, the picture is one of broad procedural alignment, tempered by systematic gaps in analytic depth, simulation use, and the institutional arrangements that bind evidence and negotiation. The same lens, applied to barriers and enablers, shows even tighter alignment: planners' reported obstacles closely match cross-phase fragilities identified in the literature. Explaining these twin findings - partial convergence on methods, strong convergence on issues - points back to the informational and institutional distances noted at the outset and to uneven urban-freight governance maturity across Europe.

A phase-by-phase reading first compares the methods planners report with those proposed in guidelines and the literature. In Phase 1, both worlds start the same way: build durable partnerships, define scope, and ground diagnosis in shared data and explicit indicators. Planners set up FQPs or MSPs, delimit functional geography, and assemble evidence from registers, loading-bay inventories, counts, camera tallies, and mandated datasets. KPI drafting opens, and existing city models are fed or extended when possible. This follows the SULP playbook. The difference lies in depth and instrumentation. The "desk" side pushes farther into context-sensitive governance micro-design and calls for an instrumented baseline that couples integrated demand models, agent-based engines, Digital Twins, and spatial consensus tools. Many administrations, by contrast, work with minimal baselines that limit diagnostic analysis. The result is convergence on structure and purpose, and divergence in diagnostic efficiency and in treating governance design as a methodological object rather than a mere setting.

Phase 2 shows a similar pattern. On paper and in practice, strategy work is participatory and scenario-driven, iterating toward a shared vision expressed through measurable objectives. Planners re-mobilise Phase-1 platforms, run topic sessions, and co-design objectives on emissions, efficiency, congestion, safety, and modal shift. They explore multiple horizons and, when capacity allows, test bundles in models or assemble datasets to trace effects across actors and area types. Guidelines and literature endorse this trajectory but advocate a tighter coupling of facilitation and modelling, with complex-systems analysis, thresholded KPI suites carried from visioning to appraisal, and iterative simulation loops to surface tipping points and interactions. Where staff and data are scarce, freight scenarios feed on major road projects or skip formal modelling; where coalitions and academic partners are stronger, administrations run ABMs, broaden inter-municipal governance, and anchor policy covenants in shared analytics. Thus, the backbone aligns: the divergence lies in using models as negotiation devices and in the discipline with which indicators travel across the whole cycle.

In Phase 3, overlap in measure adoption is clear. Curb management, access regulation, micro-infrastructure, and staged enforcement form the common repertoire. The "desk" side, however, asks that the passage from ideas to actions be codified through evidence-based selection tools, explicit responsibility and funding matrices, business-model canvases to test financial robustness, and embedded monitoring with named data-provision duties. Planners' routines vary. Some cities run camera-based enforcement and zero-emission zones with dynamic exemptions and stage soft launches; others face enforcement limits or await mandate clarity and ANPR deployment. Some packages are comprehensive and SUMP-integrated; elsewhere, ad-hoc rules linger in consultation and evaluation slides into ex-post checks. Again, the difference is less about the "what" than the "how": the extent to which commitment devices, simulation-supported portfolio tests, and legally explicit steering modes are installed before adoption so that learning and adaptation are built in rather than bolted on.

On issues, alignment is striking. Both planners and the review identify chronic data scarcity and low sharing as foundational weaknesses with phase-wide effects. Both note limited freight integration within SUMPs and fragile coordination. Both flag rigid guidance that lags technological and market change. Both struggle with enforcement and spatial management under scarce curb space, opaque exemptions, and rule-breaking that outpaces operational capacity. Capacity, training, and technical support remain binding constraints that steer method choice toward what teams can deploy. Planners add texture by locating obstacles within multi-level responsibilities and political rhythms: freight's lower salience, unsettled enforcement mandates, dependence on EU funds, and the non-binding nature of SUMP/SULP processes encourage risk-averse choices and soft targets. Grid limits for depot charging, redevelopment pressure on rail or river sites, and shaky consolidation-hub business models when subsidies recede reinforce caution. Reported enablers - political mandates, region-led coalitions, Green-Deal covenants, data partnerships and dashboards, ANPR and camera automation, land-use protections for unloading, and EU framing that ties plans to credible long arcs - map one-for-one onto institutional remedies proposed in the literature.

Planners thus confirm the desk-diagnosed fault lines and supply the operational detail that explains why they harden locally.

What explains the partial misalignment on methods alongside near-complete alignment on issues? Five layers stand out. First, the very asymmetry under examination. Scholarship and guidelines optimise for generality, transferability, and methodological frontier, offering a coherent repertoire from governance micro-design to simulation-rich diagnostics. Practice optimises for implementability under constraints of staff, budgets, procurement, and political timing. Where informational and institutional distances are small - standing task forces, data partnerships and observatories, university or consultant cohorts that co-produce and translate analytics - methods travel farther and more closely match the "desk". Where distances are large - fragmented datasets, unclear mandates, staff churn - practitioners default to routines that fit available skills and decision windows, even if analytically thinner. Larger distances yield larger uptake gaps.

Second, maturity. Urban freight policy remains uneven across Europe, and formal SULP adoption is still rare. The research geography leaned on the SUMP database because no comparable SULP record exists and because few administrations have institutionally anchored a SULP. Visibility matters: what is visible and standardised is funded, monitored, and emulated; what is invisible stays sporadic and context-bound. In formative settings, teams focus on mandate, convening, and visible first wins, not on Digital Twins or ABMs that require stable governance and sustained data flows. Where region-led governance, recurring groups, and formal partnerships exist, co-creation couples with modelling and KPI architectures persist across phases. Furthermore, the still early SULP development stage (with only 7 cities having formally adopted one) explains both minimal baselines and a path-dependent reliance on passenger-oriented models in some administrations, as well as more advanced mixes elsewhere.

Third, political economy. Freight has low salience in local politics, which induces caution when targets must clear adoption. Non-binding plan status, election cycles, and split competencies make hard commitments costly, especially when enforcement resources are thin and when interdependencies with national law or utilities (such as charging grids) sit outside municipal control. Under these conditions, the guidelines' emphasis on procedural clarity, consensus-building, and bankable packages becomes a pragmatic filter. The literature's call for iterative, simulation-supported negotiation competes with incentives to avoid controversy and to prioritise measures that pass legal and political review quickly. The divergence reflects adaptation to constraints, not a rejection of methodological innovation.

Fourth, capabilities. Small or temporary internal teams lean on consultants or universities. This supports method adoption in preparation, but can create a black-box effect: sophisticated tools appear in drafting yet prove too costly or complex for routine monitoring, so indicator suites and appraisal logics fade in delivery. When external partners embed as neutral facilitators within living-lab settings and data-sharing agreements, collaboration can catalyse durable transfer - especially if camera enforcement, ANPR, and licensing make data provision contractual rather than discretionary. The difference between episodic outsourcing and co-production with institutionalised data duties helps explain divergent trajectories in modelling depth and monitoring continuity.

Fifth, the binding constraint appears infrastructural and institutional rather than conceptual. Planners do not dispute academic frameworks or the sequence in guidelines; they face a recurrent chain that begins with weak integration, passes through fragile cooperation and rigid guidance uptake, and ends with thin enforcement. Reported enablers - mandate, measurement, partnership - are precisely the levers elevated on the "desk" side. Policy action should shrink institutional and informational distances. It should formalise freight within SUMP so that objectives, indicators, and responsibilities are shared and binding. It should also establish data partnerships and observatories that standardise and anonymise flows for model-supported negotiation, as well as invest in enforcement technologies and legal clarity to ensure that access rules and curb policies are credible. Furthermore, it should stabilise capability through training, peer learning, and co-production, making analytics repeatable rather than episodic. Under these conditions, instrument-rich routines documented in the literature become proportional responses to the complexity of co-governing urban logistics.

Read together, the three vertices of the methodological "triangle" align rather than clash. Guidelines supply a common procedural language that travels across jurisdictions. The literature adds efficient micro-design choices and modelling loops that turn that language into adaptive practice. Planners show where the architecture holds and where it buckles under real constraints. Alignment is strongest where mandate, measurement, and partnership coalesce into institutional stamina; it weakens where freight remains an adjunct to passenger-focused routines and where the information base cannot support iterative, simulation-supported co-production. The policy task is less to rewrite the canon than to create the conditions that allow full use of it.

5. Conclusion

This study examines the junction where guidance, scholarship and practice meet in urban freight planning. Across the SULP cycle, evidence shows broad agreement on process design and decision principles, alongside persistent gaps in analytical depth and instrumentation. Guidelines and literature converge on evidence-based, stakeholder-centred planning built on coherent indicators. Day-to-day routines, however, often lack the capacity to sustain simulation-rich, iterative co-production. Methods align only in part, while problems that hinder delivery align strongly. That pattern becomes clear once the institutional and informational conditions facing planning teams come into view.

On RQ1, official SULP guidelines and recent literature align on objectives and sequencing, less so on the operational grammar for analysis and negotiation. Both endorse early coalition-building, scoped diagnostics, participatory scenarios, measurable targets and embedded monitoring, and both treat governance strength and accountability as design variables. Divergence lies in granularity and iteration. Guidelines codify a transferable procedure that favours clarity and comparability across jurisdictions. The literature follows the same route with finer instruments: governance micro-design that anticipates legal steering; modelling loops that carry KPI suites from visioning to appraisal; spatial consensus devices that make preferences actionable; and high-resolution simulation (integrated demand models, ABM, DT) that turns facilitation into evidence-anchored foresight. Alignment is strong on the "what" and qualified on the "how", with scholarship specifying the instrumented micro-procedures that keep the sequence adaptive under contention and uncertainty.

On RQ2, reported practices mirror guideline suggestions but vary in depth. Planners establish FQPs or MSPs, define functional scope, assemble baselines from registers, loading-bay inventories, counts and camera tallies, and draft KPIs. Where capacity allows, passenger-oriented models gain freight layers and support advanced scenario tests. Strategy work remains participatory and scenario-driven, yet formal modelling and ex-ante appraisal often meet limits in staff, data and procurement. Measure planning converges on a pragmatic mix - curb management, access regulation, proximity infrastructure and staged enforcement - implemented with uneven maturity and monitoring discipline.

On RQ3, five recurrent layers explain differences and similarities. First, institutional–informativeness asymmetry separates frontier methods from implementable routines. A greater distance in governance stamina and shared data produces wider uptake gaps. Second, maturity matters. In formative settings, effort centres on mandate, convening and visible first wins. Where governance is institutionalised - rules, roles and routines defined - planning sustains iterative modelling and carries a coherent KPI set from diagnosis through implementation and monitoring. Third, political economy shapes method choice. Low salience, non-binding plans, fragmented competencies and dependence on national law and utilities make hard targets and costly analytics risky, rewarding procedural clarity and bankable packages. Fourth, administrative capability conditions transfer. Episodic outsourcing can create black-box dependence and erode monitoring continuity, while co-production with institutionalised data duties enables durable internalisation. Fifth, infrastructural and institutional constraints bind most tightly. Without standardised observatories, enforceable access regimes and stable responsibility matrices, even well-designed methodologies cannot iterate. Where mandate, measurement and partnership coalesce, practice approaches the literature-augmented canon. Elsewhere, divergence reflects the constraints planners describe.

The gaps that channel method choice match the desk analysis: chronic data scarcity and low sharing; weak integration of freight within SUMPs; fragile coordination and engagement; rigid and slow guidance; enforcement and space-management difficulties; and binding limits on capacity, training and technical support. Planners place these within multi-level responsibilities and political rhythms. In detail, they cite low salience, non-binding status, election-cycle volatility, unsettled enforcement mandates, dependence on external funds, grid constraints for depot charging and unresolved business models for logistics infrastructure as key barriers. Where enablers exist - clear mandates, region-led governance, long-term partnerships, data-sharing agreements, ANPR-supported enforcement, land-use protections and EU framing - coalitions stabilise and method adoption deepens.

The shared diagnosis yields a clear policy implication. Progress depends less on new guidance than on conditions that enable its full use. Formalising freight within the SUMP architecture makes objectives, indicators, and responsibilities shared and enforceable. Data partnerships and observatories institutionalise standardised and anonymised streams for model-supported negotiation. Technologies and legal clarity give curb-space rules credibility, while training, peer learning, and living-lab co-production stabilise capability so analytics become routine rather than episodic. Under these conditions, the instrument-rich routines advanced by scholarship match the complexity of co-governing urban logistics.

In sum, the study shows where guidance and scholarship already travel together and where practice diverges for sensible reasons. The infrastructures of mandate, measurement and partnership remain incomplete in many settings. Making those infrastructures the first target of policy attention can move cities from partial alignment on methods and near-complete alignment on problems to a setting where strategy, modelling and governance co-

evolve, and SULPs function as living instruments rather than checklists. The study also has limits, including uneven depth in qualitative materials and scope for more advanced qualitative techniques to refine mechanism tracing across contexts. Future research should apply stronger qualitative designs across a broader set of cities and institutional settings, triangulate interviews with operational data, and track how modelling loops and KPI architectures take root and persist across phases.

Abbreviations

ABM	Agent-Based Model
AI	Artificial Intelligence
ANPR	Automatic Number Plate Recognition system
CAS	Complex Adaptive Systems
CBA	Cost-Benefit Analysis
DT	Digital Twin
EGUM	Expert Group on Urban Mobility
ELTIS	EU Urban Mobility Observatory
EU	European Union
FQP	Freight Quality Partnership
FUA	Functional Urban Area
GIS	Geographic Information System
HoReCa	Hotellerie, Restaurants, Catering
IoT	Internet of Things
KPI	Key Performance Indicator
LCI	Local Compatibility Index
LSI	Logistics Sustainability Index
LTZ	Limited Traffic Zone
MAMCA	Multi-Actor Multi-Criteria Analysis
MCA	Multi-Criteria Analysis
MSP	Multi-Stakeholder Platform
NIMBY	Not-In-My-Backyard
PRISMA	Preferred Reporting Items for Systematic reviews and Meta-Analyses
PUDO	Pick-Up-Drop-Off
RTSD	Real-Time Spatial Delphi
SCBA	Social Cost-Benefit Analysis
SME	Small and Medium Enterprises
SULP	Sustainable Urban Logistics Plan
SUMP	Sustainable Urban Mobility Plan
TEN-T	Trans-European Transport Network
UFT	Urban Freight Transport

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