Minnesota Journal of Business Law and Entrepreneurship

Volume 2026, No. 3

ISSN: 1540-3270

Leveraging ODA for Climate and Infrastructure Finance: A Systematic Literature Review of Sub -National Studies using TCCM and ADO Framework

Reeti Sharma Sujith' Durairaj Kumarasamy*

Abstract:

Official Development Assistance (ODA) or Foreign Aid has remained one of the significant sources of development finance for economic growth and infrastructure development in developing economies. While a substantial part of literature has studied the relationship between ODA and economic growth at the national level, significantly less attention has been given to understanding the influence of ODA on development outcomes at the sub-national level. Given the rising flows of assistance at state level and increasing decentralisation of planning and implementation of development projects, understanding the impact of such flows at the sub national has become essential for designing more effective development interventions. This study conducts a systematic review of literature of state or sub-national studies on ODA flows published between 2000 till 2025. This review applies the Theory Context Characteristics and Methodology (TCCM) and Antecedents Decisions Outcomes (ADO) framework to examine the theoretical foundations, key methodologies adopted ad implementation mechanism and development outcomes of ODA financed infrastructure. Findings suggest that there has been a growing shift from aggregate studies too localised analysis of ODA effectiveness. Evidence establishes that ODA contributes positively to economic development when it is associated with effective institutions, governance, and absorptive capacity. The findings of the review suggest significant gaps in state or sub national level research in developing countries and proposes future research focusing on localised development outcomes due to ODA flows.

Keywords: Official Development Assistance, Sub-National, TCCM Framework, ADO Framework, Systematic Literature Review

1. Introduction

Official Development Assistance (ODA) has aided development finance for low ad middle-income countries since long. Over the past decades, donors both bilateral and multilateral have directed such concessional financing as investments into variety of sectors including transport, energy, urban development and water, to reduce poverty, drive growth and integrate developing economies into global value chains (Calderon & Serven, 2010). However, most of the empirical research on aid effectiveness has focused exclusively on national aggregates, investigating whether to total ODA flows are associated with progress in GDP, and other macroeconomic variables (Burnside and Dollar, 2000; Easterly, 2003; Arndt, Jones, & Tarp, 2015). As most of the projects funded through such flows are implemented at sub national or district level, it is important to determine whether ODA delivers its intended outcomes. The absorptive capacity of institutions at sub national level and their quality as well as political economy of aid allocation across regions play an important determining factor. There has been a growing shift in body of scholarship, from national aggregates to the region, sub national, district or community level (Dreher, Fuchs, Parks, Strange, and Tierney, 2021; Ziff, 2023; Shula and Jain, 2020). This has been also possible due the data availability through OECD Creditor Reporting System which helps the researchers to map individual projects funded by ODA to specific geographies and assess their impact on local development. There is a pattern revealed in sub national analysis that allocation of ODA flows within recipient countries are often driven by political preference rather than development need of the state (Dreher et al., 2021; Krishna, 2024; Kumar, Shukla, and Jain, 2020). Region or sub nation wise the ODA flows have heterogeneous impact depending on the quality of institutions and governance (Sharma and Patel,2024; Chakraborty, Verma, and Mehta, 2022). Moreover, absorption failures and flows fragmentation are particularly accentuated at the sub national level (Carlitz and

Ziaja, 2023). Even there is an increasing literature on ODA flows at sub-national level, there is no systematic review of the evidence on ODA and infrastructure finance at sub national level. None of the review mapped the theoretical evolution or identified the key antecedents, decisions, and outcomes (ADO) that describe this body of work.

This paper bridges this gap by carrying a Systematic Literature Review (SLR) of 115 studies issued between 2000 and 2025. This review is structured with two frameworks including Theory, Context, Characteristics, and Methodology (TCCM) framework by Paul and Rosado-Serrano (2019) which is also applied to good quality reviews (Pomerlyan and Belitski, 2023) and Antecedents, Decisions, Outcomes (ADO) framework. TCCM framework provide a methodical structure for examining the theoretical underpinnings, institutional situations, research characteristics and approaches of the reviewed literature. The ADO framework traces the causal links between the drivers of ODA allocation and distribution decisions to development outcomes at the state level.

The paper makes several contributions to the ODA effectiveness and development assistance literature. Firstly, it gives the comprehensive combination of sub national ODA and infrastructure finance research from 2000-2025. Using PRISMA framework, relevant work was studies to provide assessment. Secondly, it charts the theoretical foundations and methodical evolution of the literature by two distinct frameworks, suggesting that the ODA effectiveness at the sub national level is dependent on institutional quality, governance structures and coordination with donors. In addition. the ADO analysis is used to identify ways, implantation mechanisms, and development outcomes related with ODA flows. Lastly, this review identifies gaps in research and recommends a way forward towards state level research ad outcome assessment. The findings suggest a growing shift from national level assessments towards local analysis of ODA flows. Evidence reveals that ODA can positively contribute to infrastructure development, regional connectivity and local economic development when supported by quality institutions, sound governance, and absorptive capacity. The literature also highlights the challenges. Including regional disparities in ODA allocation, implementation difficulties, political bias and weak institutions. Moreover. The review finds significant gaps in sub national research in developing countries.

This paper is ordered as follows. Section 2 provides the SLR methodology with PRISMA technique. The TCCM analysis is presented in section 3. Section 4 shares the ADO framework analysis. Section 5 describes the findings and identifies the research gaps. Section 6 shares the conclusion and proposed the future of research.

2. Methodology Used for Systematic Literature Review

2.1 Research Questions

This review revolves around following research questions:

RQ1. What are major theories. Research context and characteristics and methodological approaches in the sub national ODA and its allocation to infrastructure literature?

RQ2. What are background or antecedents, decisions and development outcomes that describe ODA finances infrastructure interventions at the sub national level?

RQ3. What are the significant gaps and future research directions arising from analysis of this literature?

2.2 PRISMA Selection Process

The review adopts the PRISMA 2020 framework and uses a three-stage data collection process of assembling, arranging and assessing knowledge (Moher, Liberati, Tetzlaff, and Altman, 2009 and Paul, Lim, O'Cass, Hao, and Bresciani, 2021). Searches of keywords were conducted in Scopus using the combination of terms including ODA, foreign aid, sub national, state-wise, regional development, ODA allocation, infrastructure, bilateral, and development outcomes. The initial research has given around 574 records. The inclusion criteria basis which records were screened included publication in English in a peer reviewed journal, analysis of outcomes at the sub – national level including state, province, district and community level, and coverage of infrastructure and economic development outcomes and publication from 2000 to 2025. National aggregates analysis, studies focused on humanitarian assistance and publications low citations were in exclusion criteria. After screening the

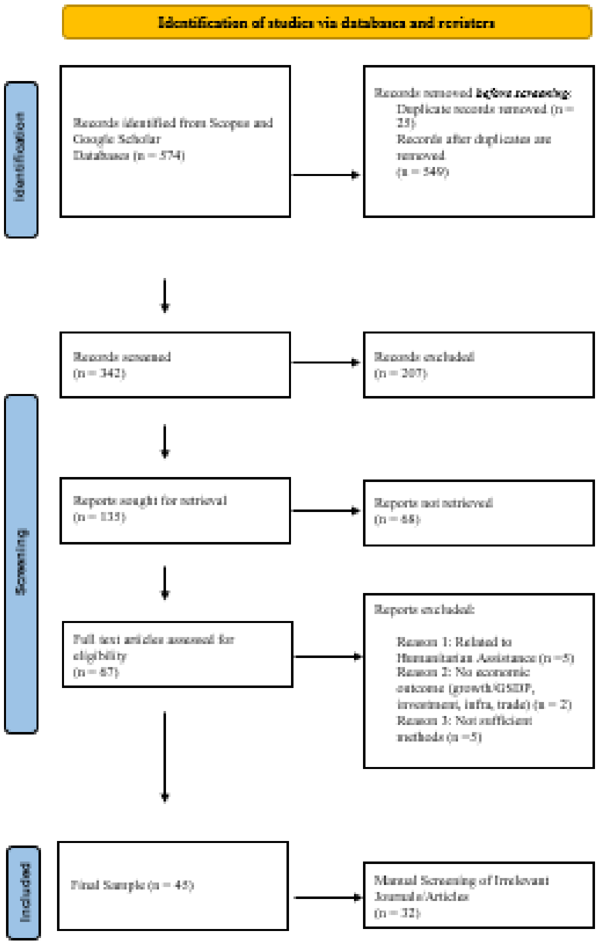
Minnesota Journal of Business Law and Entrepreneurship

Volume 2026, No. 3

ISSN: 1540-3270

abstract of around 342 records and 207 records were removed and final 135 were retained for final assessing and analysing. Figure 1 presents the flow diagram of literature selection through PRISMA technique.

Figure 1: Literature Selection Process through PRISMA 2020 Flow Diagram



Source: Authors' construction following Moher et al. (2009).

3. TCCM Framework Analysis

The Theory, Context, Characteristics, Methodologies (TCCM) framework (Paul & Rosado-Serrano, 2019) organises the synthesis of the certain chosen literature across the four extents. This structure supports for a rigorous, reproducible and comprehensive review that goes beyond narrative synthesis to identify gaps and propose future directions (Pomerlyan & Belitski, 2023).

This section is a comprehensive review of around ..papers of ODA and its impact, synthesising the major theories used across these studies, the context in ODA has been examined, the key characteristics studied, and the methodologies employed. The synthesis also discussed overall trends, insights and gaps in aid effectiveness and future course of action in the study. The table 1 presents a TCCM framework for each paper listed by first author and year.

3.1 Theory

The selected literature draws on five major theoretical traditions, which have evolved in emphasis across the review period (2000–2025).

3.1.1 ODA effectiveness and Growth Theory

The earliest sub-national studies build directly on the Burnside and Dollar (2000) conditional aid-effectiveness framework, which established that aid promotes growth only under sound macroeconomic policy environments. The extended framework of subnational research (Mavrotas, 2002; Clemens, Radelet, Bhavnani, & Bazzi, 2012) test whether the requirement of conditionality argument holds within recipient countries that is, whether states or provinces or sub nations with better fiscal, and institutional environments absorb and utilise ODA more effectively. Subnational research work also takes inspiration from the linear aid-growth model of Easterly's (2003), as scholars recognise that aggregate findings at national level may guise positive effects at subnational level in well-governed countries or regions together with negative effects somewhere else.

3.1.2 Infrastructure led growth theory

From the reviewed studies a substantial share draws on infrastructure-led economic growth theory, particularly the context developed by Calderón and Servén (2010), which identifies transport, logistics, energy and communication infrastructure as primary drivers of productivity, efficiency and trade integration. Applied to the subnational context (Sahoo, Dash, & Nataraj, 2010; Mitra, Sharma, & Véganzonès-Varoudakis, 2017; Chakraborty et al., 2022), these theoretical observations generally imply towards ODA-financed infrastructure as a supply-side intervention that reduces transaction costs, improves connectivity to markets and enables firms, and households to access extensive economic opportunities. A key invention in subnational study is the use of nighttime light data as a substitution for regional economic activity, allowing researchers to assess outcomes of infrastructure outcomes at the district or grid-cell level (Bitzer & Gören, 2024; Dreher & Lohmann, 2015).

3.1.3 Fiscal Federalism Theory

Theory of fiscal federalism (Oates, 1972) provides the institutional foundation for examining how ODA interrelates with decentralised governance structures at state level. In federal structures such as India, ODA classically flows through Department of Economic Affairs, Ministry of Finance that is central government, before being allocated to states and districts. According to Krishna (2024) and Jain and Kapoor (2015) political alignment between central and state governments significantly effects how ODA resources flows are allocated across subnational or state level, implying that in fiscal federalism mechanism intergovernmental transfers are subject to mediation from political and bureaucratic stakeholders. Sharma and Patel (2024) further demonstrate that states with stronger fiscal and governance institutions display higher absorptive capacity, leading to larger shares of received ODA flows into measurable development outcomes.

3.1.4 Theory of Political Economy

Perspectives and different aspects of political economy have become increasingly prominent in subnational ODA flows research. Dreher et al. (2021) establish that political leaders unreasonably direct ODA flows toward their constituencies and birth place. Islam and Banerjee (2021) and Kumar et al. (2020) in the Indian context, document electoral constituency with political alignment effects on ODA allocation, showing that states/sub national represented by ruling-party members receive significant amount of ODA flows to finance development and infrastructure projects. The findings have direct implications for aid or Development Assistance policy, signifying that official and recognized rules are needed for requirement-based allocation of ODA as they are often predominated by political considerations at the subnational level.

3.1.5 Institutional Theory

Institutional theory (North, 1990) underlies a growing stream of sub-national aid research that emphasises the role of formal and informal institutions in mediating the relationship between ODA and development outcomes. Weak institutions—captured by indicators such as corruption, administrative capacity and rule of law—reduce the efficiency with which ODA is converted into infrastructure outputs (Gupta & Roy, 2022; Reddy & Kumar, 2021). Conversely, donor investments in institutional capacity building, technical assistance and governance reform are found to generate multiplier effects on the productivity of physical infrastructure ODA (Mehta & Das, 2023; UNDP, 2014). This stream of research converges with the broader aid-effectiveness literature in emphasising that governance quality is a necessary, though not sufficient, condition for ODA to deliver sub-national development outcomes.

Table 1. TCCM framework summary - selected studies

Author, Year	Theory / Framework	Context	Characteristics / Focus	Methodology
Burnside & Dollar (2000)	Aid–Growth	Multi-country	Conditional aid effectiveness; policy environment	Cross-country regression
Mavrotas (2002)	Fiscal Response	India (national/state)	Aid effectiveness and sectoral impacts	Econometric analysis
Easterly (2003)	Critique of Aid-Growth	Global	Institutional inefficiencies in aid delivery	Conceptual review
Dreher & Lohmann (2015)	Regional Development	Developing economies	Aid effects stronger at sub-national level	Cobb–Douglas production model
Calderón & Servén (2010)	Infrastructure-Led Growth	Latin America/Developing	Infrastructure aid and productivity	Panel regression
Sahoo et al. (2010)	Infrastructure-Led Growth	Developing countries	ODA and public service delivery	Panel regression
Dreher et al. (2021)	Political Favouritism	Africa (sub-national)	Leaders channel aid to birth regions	Spatial and panel analysis
Krishna (2024)	Fiscal Federalism / Political Economy	India (state-level)	Political alignment influences EAP allocation	Panel data / subnational fiscal modelling
Bitzer & Gören (2024)	Aid Effectiveness	World Bank project regions	Night-time lights; localised aid impacts	Geo-referenced econometric analysis
Sharma & Patel (2024)	Institutional Theory	Indian states	Fiscal institutions improve aid absorption	Fixed-effects panel regression
Bishnoi (2023)	Aid Effectiveness	India	Infrastructure ODA and economic development	Empirical econometric analysis
Verma et al. (2023)	Development Economics	Indian states	Sectoral ODA and GSDP/health outcomes	Panel cointegration

Mehta & Das (2023)	Institutional Theory	India	Transparency and fiscal accountability	State-level fiscal modelling
Chakraborty et al. (2022)	Infrastructure-Led Growth	Indian infrastructure sector	ODA and regional infrastructure creation	Panel econometrics
Ziff (2023)	Equity Allocation	Kenya (sub-national)	Education aid inequity across counties	Sub-national data analysis
Carlitz & Ziaja (2023)	Coordination & Fragmentation	Sierra Leone; Nigeria; global	Donor fragmentation and local governance	Mixed methods
Islam & Banerjee (2021)	Political Economy	India (district level)	Aid allocation and political alignment	Regression discontinuity
Shukla & Jain (2020)	Infrastructure Development	India (district-level)	ODA infrastructure and local economic outcomes	Difference-in-differences
Kumar et al. (2020)	Political Economy	Indian states	Politically aligned states receive higher aid	Political alignment analysis
Mitra et al. (2017)	Infrastructure-Led Growth	Indian states	Infrastructure ODA and regional development	Panel data analysis
Donaubauer et al. (2016)	Aid–FDI Complementarity	Developing countries	Infrastructure aid stimulates FDI inflows	3SLS econometric estimation
Jain & Kapoor (2015)	Fiscal Federalism	India	Aid dependence and fiscal discipline	Fiscal framework analysis
Cordella & Ulku (2004)	Aid Effectiveness	Developing countries	Grants perform better in weak institutions	Cross-country panel regression
Allen et al. (2023)	Selectorate Theory	Global	Bypass aid and political leadership survival	Panel data analysis

3.2 Context

The reviewed studies with regional, geographic and institutional contexts have evolved markedly over the review period of 25 years. In the early 2000s, the research on ODA flows at subnational level was concentrated in South Asia, particularly Africa and later to India and drew deeply on Planning Commission and Reserve Bank of India data on ODA allocations to states and sectors (Planning Commission, 2012; RBI, 2013). A developing economy like India offers a uniquely robust context for subnational ODA flows research given its federal scheme, the scale and volume of multilateral and bilateral ODA received (mainly from Japan, Germany, and France), the range of institutional capacity across its 29 states, and the availability of data at state-level fiscal and development data.

The earlier wave of provincial or subnational research, has been roughly from 2016 onward, with a more diverse geographic footprint, surrounding Africa (Dreher et al., 2021; Ziff, 2023; Carlitz & Ziaja, 2023), Southeast Asia (Behera & Dash, 2020), fragile states (Yi, 2022; Kim, 2022; Brown & Marsden, 2018) and small island developing states (Vunibola, 2023).

Thematically, the reviewed literature addresses five main contextual domains: (i) Indian states and their differential ODA absorption and outcomes; (ii) sub-Saharan African districts and the political economy of aid allocation; (iii) fragile and post-conflict states where governance failures complicate infrastructure delivery; (iv) South Asian regional development corridors where ODA-financed transport and energy infrastructure spans subnational boundaries; and (v) small island developing states where infrastructure ODA is the primary source of public capital investment.

3.2 Characteristics

The reviewed studies investigate several key research characteristics and substantive themes at the sub-national or district level, which can be organised into five clusters. The first and most prominent cluster concerns infrastructure outcomes—the direct productivity and connectivity effects of ODA-financed transport, energy and water infrastructure on sub-national economic activity. Studies in this cluster typically use nighttime luminosity, district-level GDP or sectoral productivity as outcome variables and find positive but heterogeneous effects, with stronger outcomes in districts or states with better governance and institutional quality (Bitzer & Gören, 2024; Shukla & Jain, 2020; Mitra et al., 2017; Chakraborty et al., 2022).

The second cluster addresses aid allocation patterns and political economy. This stream consistently documents that ODA is allocated across sub-national units in ways that reflect political and strategic considerations rather than developmental need. In India, states that are politically aligned with the central government receive disproportionately higher ODA flows, particularly for capital-intensive infrastructure projects (Islam & Banerjee, 2021; Kumar et al., 2020; Krishna, 2024). In Africa, birth-region and constituency-level effects are documented by Dreher et al. (2021) and confirmed in subsequent replications.

The third cluster examines institutional and absorptive capacity at state level. Across literature a robust finding s that the effectiveness of ODA flows mainly to infrastructure sector is moderated by the quality of institution at state or sub-national level. States and districts with better administrative and governance capacity, lower corruption, stronger fiscal management as well as better donor-government coordination translate larger shares of ODA commitments into completed projects and measurable infrastructure development outcomes (Sharma & Patel, 2024; Gupta & Roy, 2022; Mehta & Das, 2023; Reddy & Kumar, 2021).

Donor fragmentation and coordination is addressed by the fourth cluster at the state or subnational level. Carlitz and Ziaja (2023) document that the proliferation of multilateral or bilateral donors in specific sectors and subnational units reduce the effectiveness of ODA-financed projects, creates coordination failures, and increases administrative burdens on recipient governments. In health sector of Nigeria, a lack of coordination due to higher number of donors was associated with worse health outcomes at the sub national or district level, partially due to the brain-drain into donor funded projects of local health workers. These findings call for strengthened division-of-labour mechanisms among donors at the subnational level.

The fifth cluster concerns gender, equality and inclusion dimensions of ODA flows at the district or subnational level. Several studies document systematic inequalities in the geographic or regional distribution of ODA flows, with marginalised regions, like remote areas, conflict-affected districts, areas with minority populations, consistently underserved relative to their infrastructure and developmental needs (Ziff, 2023; Larrú & González, 2022). These findings reiterate the broader effectiveness of ODA critique that donor allocation decisions, often fail to reach the poorest, most needed and vulnerable populations, even at the subnational level.

3.3 Methodology

The ODA effectiveness literature has evolved substantially including the methodological profile of the subnational literature over the review period, reflecting broad trends in development studies toward reliable causal identification. The initial literature from 2000 to around 2012 relied mostly on across states or national lelvel panel regressions with fixed effects methods and standard macroeconomic control variables (Mavrotas, 2002; Cordella & Ulku, 2004; Dreher & Lohmann, 2015). These studies while established baseline evidence on the state wise or subnational relationship between ODA flows and economic growth relationship, they were subject to concerns of endogeneity as ODA may be allocated to provinces or regions exactly because of their development shortfalls, creating reverse causality bias.

The mid-term period starting from 2010 till 2020 observed the introduction of more sorted and complex identification strategies, including using historical infrastructure or geographic distance to donor capitals as instruments called as instrumental variable approaches, differences in designs exploiting variation in completion of project timing (Shukla & Jain, 2020), and discontinuity of regression designs exploiting stringent administrative boundaries (Islam & Banerjee, 2021). These designs have strengthened the causal credibility substantially of sub-national findings.

The recent literature from 2018 to 2025 has been added by the availability of geo-coded aid data and the growing use proxies for satellite-derived outcome, particularly night time luminosity as a measure of local or sub national economic activity (Bitzer & Gören, 2024; Dreher et al., 2021). These data innovations permit analyses at resolutions—grid cells of 0.1 × 0.1 degrees, individual project footprints—that were impossible with administrative panel data alone. Spatial econometric methods, including spatial lag and spatial error models, have been increasingly used to capture spillover effects of infrastructure ODA from project locations to neighbouring areas (Larrú & González, 2022).

Table 2. Methodological profile of the reviewed literature

Research Method	Representative Studies	Period of Prevalence
Cross-country/state panel regression	Burnside & Dollar (2000); Mavrotas (2002); Cordella & Ulku (2004)	2000–2010
Time-series econometric analysis	Ghosh (2019); Singh & Narayanan (2019); Mahalik et al. (2020)	2010–2020
Difference-in-differences	Shukla & Jain (2020); Dreher & Lohmann (2015)	2013–2022
Regression discontinuity	Islam & Banerjee (2021); Krishna (2024)	2018–present
Spatial and geo-referenced analysis	Dreher et al. (2021); Bitzer & Gören (2024)	2015–present
Fixed-effects panel regression	Sharma & Patel (2024); Verma et al. (2023); Chakraborty et al. (2022)	2018–present
Mixed methods	Carlitz & Ziaja (2023); Vunibola (2023); Brown & Marsden (2018)	2015–present
Case study / qualitative	Reddy & Kumar (2021); Yi (2022); Nguefack (2023)	2000–present

Source: Authors' own

In conclusion, the TCCM analysis reveals that aid effectiveness is a conditional, context-dependent, and multidimensional concept. Theories have evolved from simple to complex, contexts from generic to specific,

Minnesota Journal of Business Law and Entrepreneurship

Volume 2026, No. 3

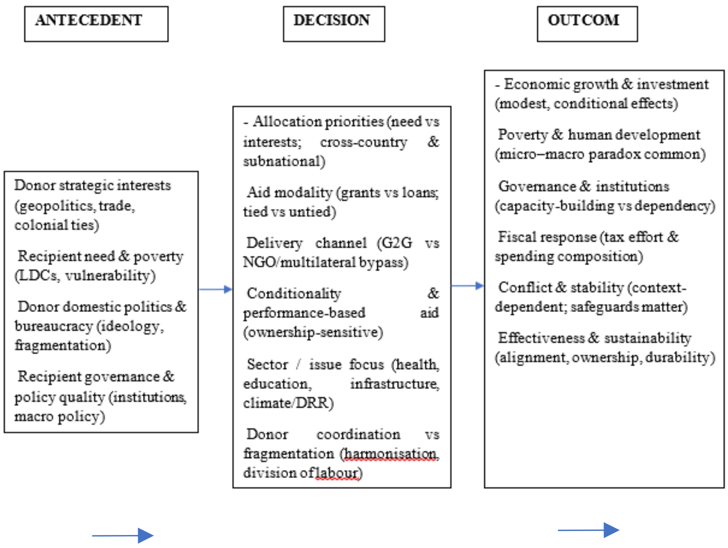
ISSN: 1540-3270

outcomes from narrow (growth) to broad (poverty, governance, etc.), and methods from simplistic correlations to sophisticated causal analysis and rich qualitative inquiry. There is no single verdict on foreign aid's effectiveness, instead, the literature offers a tapestry of findings: aid can spur development in some case, can fail or even backfire in others, and the difference lies in the interplay of motives, implementation, and context. This anlaysis underscores the significance of continuous learning and adaptation in ODA policy, implied by the nuanced evidence formed by these diverse research studies.

4. Antecedents, Decisions and Outcomes (ADO) Framework

The ADO framework offers a complementary logical structure as compared to the TCCM, drawing the causal links between the structural and contextual factors determining ODA allocation or antecedents to donor, recipient policy choices or decisions and finally the development and economic results or outcomes at the sub-national or provincial level. The ADO analysis draws inferences basis the full corpus of 135 reviewed studies.

Figure 2: ADO Framework for ODA Effectiveness Literature (2000-2024)



4.1 Antecedents: Factors Influencing Sub-National ODA Allocation

Five major decision dimensions shape how ODA-financed infrastructure interventions are designed and delivered at the sub-national level. The major sectors receiving ODA allocation include Infrastructure, Energy, Water & Sanitation and Education. Concessional loans, as they carry repayment obligations and are classically associated with large infrastructure projects, are generate stronger accountability encouragements and more robust commercial linkages (Morrissey, 2006; Cordella & Ulku, 2004).

The channel of delivery for decision whether ODA flows through central government systems, state government agencies, local government bodies, NGOs or parallel project implementation units—is a critical determinant of sub-national outcomes. Studies consistently find that bypassing existing government systems in favour of parallel delivery structures may improve short-term project implementation efficiency but undermines long-term institutional capacity at the sub-national level (Allen et al., 2023; Vunibola, 2023). On the contrary, directing ODA through state or provincial government institutions or agencies though slower and added administratively demanding, builds local at state level implementation capacity and improves the sustainability of infrastructure and development outcomes.

Sector specific and project directed focus decisions determine which subnational needs receive ODA financing. The reviewed literature establishes systematic sector biasedness for transport infrastructure and energy sectors with clear quantifiable development outputs and strong donor commercial interests receive disproportionately large volumes of subnational ODA flows in infrastructure, while poverty, education, water, sanitation, road networks and climate-resilient infrastructure remain persistently underfunded as compared to their development impact (Donaubauer, Meyer, & Nunnenkamp, 2016; Jouanjean et al., 2022; Behera & Dash, 2020).

At the state level donor conditionality and performance-based allocation have been practically uneven. Some donors, particularly multilateral institutions such as the World Bank and Asian Development Bank, connect subnational disbursements of ODA flows to reforms in governance and indicators of project performance. Although performance-based instruments can incentivise improvement in institutions, they also risking conditionalities in which the subnational units most in need of ODA financing are steadily excluded from performance or otucome-based tranches due to frail baseline governance (World Bank, 2016; UNDP, 2014).

Coordination with donor and division of labour represent a critical dimension of choice whose importance is predominantly pronounced at the state or subnational level. Carlitz and Ziaja (2023) suggests that in fragmented ODA flows landscapes where most of the donors operate in the same space of sub nationals without coordination, administrative burden on the governments at state or subnational increases sharply, which often exceeds their management capacity. The evidence from reviewed literature documents that coordinated, donor engagement with sectoral concentration at the subnational or state level, even if including fewer donors produces better outcomes in terms of infrastructure creation than environment of fragmented multiple donor.

4.3 Outcomes/Results: Development Outcomes of ODA Financing of Sub National Infrastructure

The reviewed literature establishes outcomes transversely four dimensions, with findings are heterogeneous that are consistently moderated by quality of institutions and governance capacity. The delivery of infrastructure expansion and other public service represents the most directly evaluated outcomes of interventions which are ODA-financed at the state or subnational level. Studies establish positive average effects of ODA financing using either administrative data and/or satellite-driven proxies like nighttime luminosity, road density, electrification rates on subnational or state wise economic activity, with effect dimensions ranging from modest to substantial reliant on the context of governance (Bitzer & Gören, 2024; Shukla & Jain, 2020; Chakraborty et al., 2022). The effects on infrastructure are particularly robust for transport economic corridors that connect earlier remote districts to regional, national and global markets.

Regional connectivity, low-cost logistics for trade and market integration emerge as second most important outcomes of ODA to infrastructure sector, particularly for projects that relate state or subnational units to national and international trade networks. ODA financed transport infrastructure as found by Mitra et al. (2017) in Indian states significantly improved regional market connectivity and regional productivity over a horizon of ten years. However, the gains from regional connectivity gains are unevenly distributed, characteristically benefiting regions along infrastructure and economic corridors while leaving less developed or remote areas further behind. This finding is consistent with new economic topography and growth models of agglomeration.

Subnational economic growth or development outcomes including employment, household income, poverty reduction are far less consistently recognized in the studied literature, partially due to limitation in accessibility of data and partly because they materialise over longer time limits than the typical project evaluation period. Singh and Narayanan (2019) and Das and Rao (2018) establish positive crowding-in effects of ODA flows in infrastructure sector on domestic investment in Indian states, suggesting that ODA compliments public capital financed by ODA rather than shifts or crowds out private investment. Larrú and González (2022), however, essay a 'micro-macro paradox' in the contexts of West African countires, where aggregate growth effects are noticeable but the outcomes of household-level poverty remain elusive.

In the reviewed literature the institutional capacity and governance quality are often treated as antecedents and also emerge as outcomes of ODA financing of infrastructure projects, chiefly where projects include reforms in governance and includes conditionalities or components of technical assistance or grant. Mehta and Das (2023) show that states that received sustained ODA with performance-based governance conditionalities exhibited measurable improvements in public financial management and project implementation capacity over five-year periods. These institutional outcomes can be understood as dynamic complements to physical infrastructure outcomes, creating virtuous cycles where improved governance enables more effective use of future ODA.

5. Analysis, Gaps and Future Research Agenda

4.1 Challenges in the Existing Literature

Several challenges still remain despite the growing body of research examining aid-growth nexus. Firstly, most of the existing literature is heavily concentrated on examining the relationship between aid and growth as well as other macro-economic variables at national-level , with limited evidence from sub national context, particularly impact of assistance at sub national level in developing countries. Secondly, inconsistencies in ODA related data availability and reporting across regions make comparative assessments difficult. Thirdly, many studies depend on aggregate ways to measure aid which sometimes fail to capture the local effects of infrastructure investments.

Fourth, factors related to political economy, including biases in aid allocation, governance quality, and institutional capacity, remain under-evaluated despite their significant impact on outcome of the externally aided projects. Lastly, the fragmentation of interventions by the donors and the lack of standard evaluation frameworks continue to constrain the assessment of infrastructure impacts at the regional level.

4.2 Research Gaps and Opportunities

The review finds several important gaps in the existing studies. Most prominently, there is very limited evidence in empirical research which examines the effectiveness of infrastructure-focused ODA at state, provincial, and district levels. Moreover, few studies investigate the interaction between ODA, domestic public investment, and private sector participation in infrastructure financing. From large developing economies like India, Brazil, and Indonesia the sub national evidence largely remain sparce and fragmented, suggesting significant opportunities for future research.

5.1 Key Analysis Findings

The TCCM and ADO analyses converge on four overarching findings that advance the sub-national aid-effectiveness literature beyond what national-level aggregate studies have established. First, aid composition and instrument design matter as much at the sub-national level as at the national level. The reviewed evidence consistently shows that concessional loan financing—particularly for large, identifiable infrastructure projects—is associated with stronger and more durable sub-national development outcomes than equivalent grant-financed interventions. This finding aligns with the theoretical prediction of Morrissey (2006) that loan-financed projects generate identifiable procurement linkages and accountability incentives that grants do not, and is consistent with the empirical findings on bilateral aid composition reported in the companion empirical paper by the same authors (Sharma Sujith & Kumarasamy, 2025).

Second, institutional quality is not merely a moderator but a constitutive condition of ODA effectiveness at the sub-national level. The reviewed literature constantly shows that the same ODA financed investment generates varied outcomes across subnational areas with different institutional profiles, positive and statistically significant effects in huge capacity, well governed regions/parts, and insignificant or even negative effects in regions with limited absorptive capacity and capability as well as weak governance. This result has direct policy implications including strategies of donor that overlook institutional heterogeneity among recipient countries, treating a country as a sole unit of absorption, will steadily overestimate ODA effectiveness in badly governed areas or regions and underestimate it in well governed regions.

The political economy of subnational ODA allocation represents as a third critical analysis and often non-recognised constraint on ODA effectiveness. The convergence of evidence from Africa, India, Vietnam and fragile states indicates that political alignment, electoral rounds and effects of leadership birth-region thoroughly distort ODA allocation away from developmental and economic need, regardless of formal allocation rules. This political economy forebear or antecedent is particularly influential in federal structures where central governments facilitate ODA flows to states, union territories and districts.

Fourth, fragmentation of donor at the subnational or state level is a significant and under-reported source of ODA inefficiency. The literature reviewed suggests that the managerial, administrative, transactional and coordination costs of handling many donors in a single state or subnational area can outdo the developmental and economic benefits of additional ODA volumes, particularly in regions with inadequate government capacity.

5.2 Research Gaps

The analysis identifies five gaps in the subnational ODA flows received and financing of infrastructure literature that signify areas of priority for future research. The first and most critical gap is the limited evidence base for subnational studies outside Africa, Vietnam and India. While the Indian and African contexts have generated rich bodies of evidence, comparable sub-national analyses for Southeast Asia, Latin America, Central Asia and small island developing states remain sparse. Given the substantial variation in governance, decentralisation frameworks and ODA dependence across these regions, extrapolating findings from the Africa-India literature carries significant risks of external invalidity.

The second gap concerns the long-run dynamics of infrastructure outcomes. The vast majority of reviewed studies assess ODA-financed infrastructure outcomes over relatively short horizons—typically three to seven years post-completion. Infrastructure investments in transport, energy and water typically generate their largest developmental returns over longer horizons—ten to twenty years—as complementary private investment clusters around public infrastructure and as institutional capacity adapts to manage the infrastructure asset. Longitudinal sub-national studies with ten-plus-year observation windows are almost entirely absent from the reviewed literature.

The third gap involves climate resilience and environmental sustainability dimensions of infrastructure ODA. The reviewed literature has focused overwhelmingly on conventional infrastructure outcomes—connectivity, economic activity, poverty reduction—with limited attention to whether ODA-financed infrastructure is climate-resilient, environmentally sustainable or aligned with NDC commitments. As climate adaptation finance becomes an increasingly important component of ODA—particularly for small island developing states and climate-vulnerable regions within large developing countries—sub-national research that integrates climate outcomes alongside traditional development metrics is urgently needed.

The fourth gap is the near-absence of gender-disaggregated and inclusion-focused sub-national studies. While equity dimensions of aid allocation are documented by a handful of studies (Ziff, 2023; Larrú & González, 2022), gender-disaggregated analyses of infrastructure ODA outcomes—examining whether men and women, or different socioeconomic groups, benefit differentially from ODA-financed infrastructure—are essentially absent from the reviewed corpus.

The fifth gap concerns the methodological integration of qualitative and quantitative approaches. The quantitative dominance of the recent literature—driven by the availability of geo-coded data and satellite-derived outcome proxies—has come at the cost of contextual depth. Qualitative and mixed-method studies that examine how sub-national political economies, community participation dynamics and institutional cultures shape the translation of ODA into outcomes are comparatively rare in the recent literature.

5.3 Potential Areas for Future Research

Based on the TCCM and ADO syntheses and the identified gaps, this review proposes future research of ODA flows should be beyond conventional aid-growth relationship and focus on mechanisms through which ODA flows impact different development outcomes at the sub national or local level. Comparative studies across states, regions and sector wise would be valuable and can help identify the governance and institutional condition to optimize development outcomes.

Studies should be extended beyond Africa, enabling cross-regional comparisons of sub-national ODA allocation patterns and outcomes. Moreover, longitudinal studies with more than ten-year panels should be prioritised to capture the full developmental lifecycle of infrastructure investments. Relevance of climate ODA should be focused into sub-national research, examining whether ODA-financed infrastructure is aligned with NDC commitments and generates climate co-benefits.

6. Conclusion

This study reviews systematically the literature on ODA and sectoral allocation of ODA to infrastructure at the sub-national level published between 2000 and 2025, using the TCCM and ADO analytical frameworks. While the existing literature has mainly focused on aid and growth nexus including other macro-economic parameters at national level, this study highlights the growing importance of aid or assistance in infrastructure development of recipient countries. The findings of the study indicate that ODA can contribute significantly to regional and infrastructure development in countries with absorptive capacity, strong governance structures, institutional quality and local ownership. The literature points out that ODA can improve connectivity, productivity, public service delivery and investments at the sub-national level. However, the development outcomes are highly dependent and vary considerably across regions and sectors.

The TCCM analysis reveals a literature grounded primarily in five theoretical traditions—aid-effectiveness theory, infrastructure-led growth theory, fiscal federalism, political economy and institutional theory, applied across a geographic landscape centered on India and sub-Saharan Africa. The ADO analysis traces eight ADO chains, showing that political alignment and institutional quality are the dominant antecedents of sub-national aid allocation; that financial instrument choice and delivery channel design are the most consequential delivery decisions and that infrastructure expansion, regional connectivity and institutional capacity are the primary observable outcomes. The five significant research gaps as identified include firstly, the limited coverage of subnational or state level studies, secondly, the absence of long-run evidence longitudinal, thirdly, the inattention of dimensions or focus on climate-resilience financing, fourthly, lack of gender or equality disaggregated analyses, and finally, the dominance of the quantitative recent literature at the cost of contextual depth. A six point strategy for future research agenda is proposed to help address these gaps as well as consolidate the subnational ODA effectiveness research or studies into a more comprehensive and body of evidence which is policy relevant.

For policymakers, development practitioners, and other stakeholders the essential implication of this review is that Official Development Assistance effectiveness at the subnational space is determined not by aggregate flows/volumes but by the specific arrangement of ODA instruments, channels of delivery, governance environment and coordination mechanisms in which ODA is surrounded. Concessional financing i.e. ODA flows, delivered through strengthened government institutions, governance and absorptive capacity with adequate technical assistance, well-coordinated with donors and aligned with the developmental as well as economic priorities of specific states, offers the greatest potential to generate durable and equitable sub-national development outcomes.

References:

[1] Allen, M., Tierney, M. J., & Parks, B. (2023). Selectorate theory and bypass aid: Evidence from authoritarian regimes. Journal of Development Economics, 162, 103–119.

[2] Arndt, C., Jones, S., & Tarp, F. (2015). Assessing foreign aid's long-run contribution to growth and development. World Development, 69, 6–18.

[3] Behera, D. K., & Dash, U. (2020). Health aid, public expenditure and SDG outcomes in Asia-Pacific countries. Journal of Asian Public Policy, 13(2), 198–216.

[4] Bishnoi, T. R. (2023). Impact of official development assistance on India's economic and social infrastructure. Journal of Development Economics, 158, 102–118.

[5] Bitzer, J., & Gören, E. (2024). Localised development impacts of foreign aid: Evidence from night-time lights. World Development, 175, 106–121.

[6] Brown, J., & Marsden, L. (2018). Aid coordination and effectiveness in fragile and post-conflict environments: Evidence from Afghanistan. Conflict, Security and Development, 18(4), 303–322.

[7] Burnside, C., & Dollar, D. (2000). Aid, policies and growth. American Economic Review, 90(4), 847–868.

[8] Calderón, C., & Servén, L. (2010). Infrastructure and economic development in Latin America and the Caribbean (Policy Research Working Paper). World Bank.

[9] Carlitz, R., & Ziaja, S. (2023). Donor fragmentation and coordination across sectors and local governance systems: Evidence from Sierra Leone and Nigeria. World Development, 161, 106–124.

[10] Chakraborty, P., Verma, S., & Mehta, A. (2022). ODA and regional infrastructure creation in India: Panel data evidence. Journal of Development Studies, 58(7), 1324–1340.

[11] Clemens, M. A., Radelet, S., Bhavnani, R. R., & Bazzi, S. (2012). Counting chickens when they hatch: Timing and the effects of aid on growth. Economic Journal, 122(561), 590–617.

[12] Cordella, T., & Ulku, H. (2004). Grants versus loans. IMF Working Paper WP/04/161. International Monetary Fund.

[13] Das, M., & Rao, V. (2018). External aid and state GDP in India: A regression analysis. Economic and Political Weekly, 53(22), 44–52.

[14] Donaubauer, J., Meyer, B. E., & Nunnenkamp, P. (2016). Aid, infrastructure and FDI: Assessing the transmission channel with a new index of infrastructure. World Development, 78, 230–245.

[15] Dreher, A., Fuchs, A., Parks, B., Strange, A., & Tierney, M. J. (2021). Aid, China, and growth: Evidence from a new global development finance dataset. American Economic Journal: Economic Policy, 13(2), 135–174.

[16] Dreher, A., & Lohmann, S. (2015). Aid and growth at the regional level. Oxford Review of Economic Policy, 31(3–4), 420–446.

[17] Easterly, W. (2003). Can foreign aid buy growth? Journal of Economic Perspectives, 17(3), 23–48.

[18] Ghosh, S. (2019). ODA, public investment and GDP growth in India: A Keynesian perspective. Economic Modelling, 76, 109–121.

[19] Gupta, R., & Roy, D. (2022). Governance quality and aid effectiveness in South Asia. South Asian Journal of Macroeconomics and Public Finance, 11(1), 24–47.

[20] Islam, R., & Banerjee, S. (2021). Aid allocation and political alignment in India: Evidence from a regression discontinuity design. Journal of Development Economics, 149, 102–118.

[21] Jain, N., & Kapoor, M. (2015). Aid dependence and fiscal discipline in Indian states. Journal of South Asian Development, 10(2), 157–184.

[22] Jouanjean, M. A., Gachassin, M., & te Velde, D. W. (2022). Regional infrastructure for trade facilitation: Impact on growth and poverty reduction (ODI Working Paper). Overseas Development Institute.

[23] Kim, K. (2022). Mutual accountability frameworks in fragile states: Evidence from bilateral aid programmes. Development Policy Review, 40(3), e12601.

[24] Krishna, A. (2024). Political alignment and ODA allocation across Indian states: Fiscal federalism and political economy perspectives. Public Finance Review, 52(1), 78–104.

[25] Kumar, A., Shukla, R., & Jain, M. (2020). Political alignment and aid allocation in Indian states. Economic and Political Weekly, 55(18), 38–46.

[26] Larrú, J. M., & González, S. (2022). Aid, growth and poverty in West Africa: The micro-macro paradox. Journal of African Economies, 31(2), 144–168.

[27] Mahalik, M. K., Mohapatra, G., & Sahoo, B. K. (2020). Does foreign aid stimulate renewable energy adoption and reduce CO2 emissions in India? Renewable and Sustainable Energy Reviews, 120, 109632.

[28] Mavrotas, G. (2002). Aid and fiscal response: The sector budget support and the effectiveness debate. European Journal of Development Research, 14(1), 134–156.

[29] Mehta, A., & Das, R. (2023). Fiscal accountability, transparency and aid effectiveness in Indian states. Journal of Asian Economics, 84, 101–118.

[30] Mitra, A., Sharma, C., & Véganzonès-Varoudakis, M. A. (2017). Infrastructure, productivity and competitiveness across Indian states. Journal of Policy Modeling, 38(5), 888–908.

[31] Miyamoto, K., & Chiofalo, E. (2015). Official development finance for infrastructure: Support by multilateral and bilateral development partners (OECD Development Co-operation Working Paper). OECD Publishing.

[32] Miyamoto, K., & Chiofalo, E. (2021). Japan's infrastructure assistance to India: Trends and implications (OECD Working Paper). OECD Publishing.

[33] Moher, D., Liberati, A., Tetzlaff, J., & Altman, D. G. (2009). Preferred reporting items for systematic reviews and meta-analyses: The PRISMA statement. PLoS Medicine, 6(7), e1000097.

[34] Morrissey, O. (2006). Aid or trade, or aid and trade? Australian Economic Review, 39(1), 78–88.

[35] Nguefack, B. (2023). Modernisation, dependency and health aid in Uganda. Development and Change, 54(2), 301–328.

[36] North, D. (1990). Institutions, institutional change and economic performance. Cambridge University Press.

[37] Organisation for Economic Co-operation and Development. (2022). Creditor Reporting System (CRS) aid activity database. OECD.

[38] Paul, J., Lim, W. M., O'Cass, A., Hao, A. W., & Bresciani, S. (2021). Scientific procedures and rationales for systematic literature reviews (SPAR-4-SLR). International Journal of Consumer Studies, 45(4), 1–16.

[39] Paul, J., & Rosado-Serrano, A. (2019). Gradual internationalization vs born-global/international new venture models: A review and research agenda. International Marketing Review, 36(6), 830–858.

[40] Planning Commission, Government of India. (2012). Twelfth five-year plan: ODA and external assistance. Government of India.

[41] Pomerlyan, E., & Belitski, M. (2023). Integration-growth relationship: A literature review and future research agenda using a TCCM approach. European Management Journal, 41(6), 1106–1118.

[42] Rabehajaina, T., Lolita, D., & Wambura, A. (2023). Donor motives and ODA allocation: Panel regression evidence. Journal of Development Economics, 163, 103–121.

[43] Rao, K., Singh, A., & Bose, S. (2020). Aid and FDI complementarity in South Asia: Panel data evidence. South Asian Economic Journal, 21(1), 62–85.

[44] RBI (Reserve Bank of India). (2013). Report on external assistance to India: Macroeconomic and fiscal dimensions. Reserve Bank of India.

[45] Reddy, R., & Kumar, S. (2021). Donor coordination and development outcomes in high-ODA Indian states. Journal of South Asian Development, 16(3), 289–314.

[46] Sahoo, P., Dash, R. K., & Nataraj, G. (2010). Infrastructure development and economic growth in China. IDE Discussion Paper No. 261. Institute of Developing Economies.

[47] Sharma, C., & Patel, A. (2024). Fiscal institutions and aid absorption capacity across Indian states. Journal of Development Studies, 60(2), 215–234.

[48] Sharma Sujith, R., & Kumarasamy, D. (2025). Does bilateral ODA composition matter for trade? Loans, grants and infrastructure aid in India's aid-trade nexus. Manuscript under review.

[49] Shukla, R., & Jain, M. (2020). ODA-funded infrastructure and local economic outcomes in India: Difference-in-differences evidence. World Development, 135, 105–121.

[50] Singh, H., & Narayanan, A. (2019). Does ODA crowd in domestic investment in India? Time-series GMM estimation. Journal of Asian Economics, 62, 12–24.

[51] UNDP (United Nations Development Programme). (2014). Monitoring, governance and project performance in Indian ODA-financed projects: Policy review. UNDP.

[52] Verma, S., Chakraborty, P., & Mehta, A. (2023). Sectoral ODA and sub-national development outcomes in India. Regional Studies, 57(6), 1021–1038.

[53] Vunibola, S. (2023). Local participation and community voice in aid projects: Evidence from Fiji. Development in Practice, 33(2), 188–201.

[54] Wen, H., Zhang, Y., & Chen, L. (2023). Does aid improve tax revenue mobilisation? Evidence from a panel of developing countries. Journal of International Development, 35(4), 618–641.

[55] World Bank. (2016). Project performance assessment: ODA-funded infrastructure and health services in Indian states. World Bank Group.

[56] Yi, S. (2022). Security aid and institutional stabilisation in fragile states. Journal of Conflict Resolution, 66(4), 821–847.

[57] Ziff, A. (2023). Equity in education aid: Sub-national allocation evidence from Kenya. World Development, 162, 106–124.