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The "Back-Basket Line" as an Institutional Experiment of Inclusive Redundant Capacity— A Mechanistic Analysis of Human-Centered Governance, Inclusive Service, and Governance Modernization in Megacities

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Abstract: This report examines Chongqing's "Back-Basket Line" as a case study, engaging with the problem nexus of human-centeredness—shared inclusivity—governance modernization. It introduces the institutional concept of Inclusive Service Unit (ISU), defined as "inclusive redundant capacity," and proposes a social welfare increment function (ΔW) as an evaluative framework. This function incorporates vegetable farmers' profits, urban consumers' surplus, and inclusivity/trust dividends on the benefit side, while accounting for operational expenditures, capital amortization, farebox opportunity costs, and externality governance costs on the burden side. Methodologically, the study employs qualitative case analysis, stakeholder mapping via a "governance community" model, and cost–benefit estimation, triangulated through multi-method cross-validation. Findings show that under non-peak windows with soft constraints (caps, time slots, packaging/cleanliness protocols), typical farmers realize a daily net income gain of about 78.5 RMB, or ~18,840 RMB annually. Additional benefits include annual cash savings on transport (~4,560 RMB), time savings (~768 hours), and indirect gains such as lower spoilage and price premiums. Conversely, when peak-hour overlap remains low, farebox opportunity costs fall within "noise" levels, though risks of capital return dilution and congestion externalities require caution. The report distills four transferable design principles: verifiable redundancy, low-interference embedding, micro-cost hedging, and end-to-end closure. The contribution lies in translating the normative rhetoric of "urban warmth" into an auditable and comparable metric framework, furnishing falsifiable propositions and a toolbox-style pathway. It offers theoretical and policy reference for megacities seeking low-marginal-cost incremental equity within existing infrastructure.

Keywords: Back-Basket Line; Human-Centered Governance; Inclusive Service; Governance Modernization; Inclusive Service Unit

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1. Origins and Context of Chongqing's "Back-Basket Line"

The "Back-Basket Line" in Chongqing is a practice where rural farmers carrying bamboo baskets ride the metro to sell produce, linking rural livelihoods with urban markets and earning the name of a civic lifeline. The term originates from Metro Line 4 (Phase II). Since the opening of Shichuan Station in June 2022, many farmers from nearby towns have boarded early trains with vegetables, and the section to the city center became known as the "Back-Basket Line."

At dawn, farmers take feeder buses to Shichuan, then the first metro services. To support them, staff open facilities 20 minutes early, provide rest areas, and designate “basket cars.” Many riders are elderly and benefit from free transit. Around 6:10 a.m., farmers undergo quick handheld security checks before traveling nearly 50 km in just over an hour to reach markets.

The practice has drawn broad attention as a symbol of human-centered, inclusive governance. Similar initiatives include ferries in Zhongxian with cheaper fares and pier markets, and Changshou’s Route 180 bus that accommodates baskets with driver assistance. Together these create a livelihood-oriented mobility network connecting rural farmers and urban residents.

This report examines the “Back-Basket Line” as a case of urban governance, analyzing its human-centered rationale, inclusive service practices, and implications for governance modernization in megacities.

2. Human-Centered Urbanism, Inclusive Governance, and Governance Modernization

2.1. Human-Centered Urbanism

The concept of human-centered urbanism critiques overreliance on technology and efficiency, emphasizing human needs, dignity, and well-being in planning and governance [1]. Gehl and Svarre argue cities should be scaled to pedestrians, the elderly, and children, shifting from “for cars” to “for people” [2]. This paradigm now extends into governance debates on service accessibility, transport equity, and spatial justice [3].

In transport, Banister’s framework stresses equity and provision for vulnerable groups, offering justification for the “Back-Basket Line” [4]. Optimization should balance efficiency with the daily needs of low-income and marginalized populations.

In Global South contexts, human-centered approaches confront resource scarcity, rapid urbanization, and limited governance [5]. The Chongqing case shows targeted support for elderly farmers through low-cost service adjustments, a “non-mainstream” model of governance.

Thus, human-centered urbanism frames transport as a social protection mechanism, grounding the legitimacy and significance of the “Back-Basket Line.”

2.2. Inclusive Governance

Inclusive governance has become a central theme in contemporary urban studies, referring to institutionalized responses to social diversity, equity, and the participation of marginalized groups in policymaking and service design [6]. It posits that governments must go beyond serving “mainstream citizens” to recognize and address the voices of peripheral groups, thereby reinforcing both legitimacy and effectiveness. In the context of cities in the Global South, Roy’s notion of the *politics of informality* stresses that governance of street vendors and informal settlers should not be limited to clearance or regulation but should instead explore more inclusive models [7]. This provides direct insights into the openness of metro services to farmers and the creation of market spaces in the “Back-Basket Line.”

In transport governance, Lucas and colleagues have shown that *transport poverty* is closely linked to *social exclusion*, particularly in peripheral urban areas [8]. If transport services fail to extend to low-income or informal-economy workers, their marginalization is exacerbated. Thus, an inclusive model of transport governance requires attention to extending services to non-mainstream demand groups, recognizing the integrative function of transport in fostering social cohesion.

The practices associated with Chongqing’s “Back-Basket Line”—such as designating special carriages for farmers, establishing customized markets, and reducing or waiving fares—constitute localized enactments of inclusive governance. These measures do not imply laissez-faire management but rather *institutionalized inclusion*: strategic, rule-based responses to differentiated needs.

2.3. Urban Governance Modernization and Collaborative Mechanisms

Governance modernization emphasizes efficiency, transparency, digital intelligence, and participation [9]. At the city level, it often means shifting from "government" to "governance networks," with collaboration, coordination, and data-driven decisions [10]. In transport, this occurs through smart systems and cross-actor cooperation.

Chongqing's "Back-Basket Line" shows a China-specific model: metro operators, enforcement agencies, grassroots offices, and market managers jointly adjusted services for farmers, reflecting institutional adaptability and resilience. Unlike Western formal hearings, demands were addressed through flexible, informal responses, demonstrating China's soft governance competence [11].

3. Research Methods and Analytical Strategy

This report adopts multi-method triangulation to enhance both theoretical explanation and policy analysis of the "Back-Basket Line." It integrates three tools: qualitative case study, stakeholder analysis, and cost–benefit analysis, aiming to preserve empirical authenticity while assessing governance significance.

The qualitative case study provides the descriptive foundation. As an organically evolved practice, the "Back-Basket Line" is deeply localized, making it suitable for detailed inquiry into mechanisms and governance logic. The core case is Metro Line 4 from Shichuan Station to the urban core. Methods include textual analysis, field observation, and informal interviews (June–July 2024), supported by policy notices, metro data, and media reports. Synthesizing these sources, the study reconstructs its formation and role within Chongqing's governance system.

Stakeholder analysis explores functional interactions and goal alignment. In China's governance system, actors such as the metro company, bus operators, subdistrict offices, and markets are institutionally embedded in the party-state framework. They are better viewed as components of a "governance community" rather than independent entities. This report models them collectively as a single governance actor, focusing on resource allocation, fiscal spending, and mobilization. The governed—primarily rural farmers and urban consumers—form the counterpart group. The analysis thus evaluates government-led legitimacy and the balance of costs and benefits.

Cost–benefit analysis examines fiscal inputs and social returns. Costs include subsidies, free transit for the elderly, and marginal expenses for ancillary facilities. Benefits include higher farmer income, consumer access to fresh produce, and inclusivity dividends such as trust and cohesion. Despite data limits, reasonable assumptions and comparative indicators allow structured evidence for policy evaluation.

4. Operational Mechanisms and Social Impacts of Chongqing's "Back-Basket Line"

4.1. A Full-Chain Service Mechanism: From Fields to City Markets

The operational mechanism of Chongqing's "Back-Basket Line" encompasses the entire chain from rural production sites to urban marketplaces. Through a series of coordinated measures, it ensures that vegetable farmers can enter the city to sell produce in an efficient, orderly, and dignified manner. Its success lies in the government and related units' comprehensive optimization around farmers' needs—covering not only transport services but also market arrangements—thereby achieving a closed-loop system from the "first kilometer" of agricultural logistics to the "last kilometer" of urban sales. The following analysis reconstructs the daily journey of a farmer, highlighting how each stage is supported by tailored mechanisms and service details.

4.2. Rural Departure: Feeder Buses Bridging the "Last Mile"

Farmers traditionally faced significant "last-mile" difficulties traveling from their villages to metro stations in the early morning. To address this, on April 19, 2024, the city introduced Bus Route 9106 as a dedicated feeder line to support the "Back-Basket Line." Covering 15 kilometers with 11 intermediate stops, the service links Yingtan in Tongjing Town (Yubei District) directly to Huangling and Shichuan stations on Metro Line 4. Four mid-sized buses operate in rotation, offering 16 services per day between 6:30 a.m. and 6:30 p.m., with a fare of 2 RMB and full integration into the one-hour free transfer discount system. For rural residents—especially farmers carrying produce—this line dramatically reduces the difficulty and cost of accessing the metro.

Local accounts highlight the impact: prior to the feeder service, residents relied on informal "ring-road" vans with multiple transfers; now, a direct, low-cost connection allows seamless transfer to the metro. In effect, this "small line" links peripheral villages with urban rail transit, enabling punctual and affordable access to the metro system and laying the foundation for the subsequent journey.

4.3. Station Access: Human-Centered Measures for Smooth Travel

At Shichuan Station, farmers benefit from measures ensuring convenience and safety. The station opens 20 minutes early, with escalators and elevators activated in advance. Waiting areas, basket zones, and benches for elderly riders are also provided.

Because large bamboo baskets are unsuitable for X-ray machines, handheld detectors are used, balancing safety and speed. Farmers note staff often help with heavy loads, reflecting a spirit of care.

On trains, the carriage nearest elevators is designated a "basket carriage." Farmers place baskets in corners or under seats, often using clean, covered containers to maintain hygiene. This cooperation with staff keeps the carriage orderly. The metro company affirms that produce is permitted and explicitly welcomes farmers. Media praise this inclusivity: "One train holds both the commuter's briefcase and the farmer's basket," a symbol of urban warmth.

4.4. Urban Sales: Market Space Provision and Orderly Management

Once in the city, the availability of sales space is decisive: without venues, efficient transport cannot solve farmers' livelihood issues. Chongqing's innovation is government–enterprise collaboration to provide fixed, cost-free spaces, granting farmers legitimate market access while balancing urban order and farmer income.

Two venue types now operate: (1) *"Back-Basket Zones"* within wet markets; and (2) an *"Underground Air-Raid Shelter Market."*

At Guanyinqiao—one of Chongqing's busiest districts—authorities and Jianxing Market allocated 1,000+ m² for a free *Back-Basket Zone*. Farmers from Shichuan sell without fees, laying mats to display produce. Managers even moved infrastructure to improve comfort. Prices stay competitive without middlemen, attracting strong consumer traffic. Media coverage spurred replication: other markets near metro stations created free or low-cost zones, framed as *corporate social responsibility* while boosting footfall. As one manager noted: *"It costs us little, but solves a major problem for farmers."*

More innovatively, in 2024 an idle shelter near Hongtudi Station (Line 10) became a *"Back-Basket Market."* Under government coordination, 700 m² was opened for Saturday markets. The venue—cool in summer, warm in winter—remains cost-free for farmers. To stimulate demand, the operator issued 16,000 RMB in vouchers to residents, while subdistricts promoted it via WeChat groups. Results were swift: one farmer sold 120 kg of produce in 30 minutes, earning 400 RMB.

This model replaced precarious *"guerrilla vending"* with secure venues, reduced clashes with urban management, and gave commercial firms reputational gains by activating idle assets. Collectively, these measures institutionalize the *"last kilometer"* of supply, embedding inclusivity and order into Chongqing's governance framework.

5. Livelihood Gains and Cost Considerations

Since its inception, Chongqing's "Back-Basket Line" has generated significant socioeconomic benefits and has been hailed as a paradigm of "small intervention, big livelihood impact." Nevertheless, any policy measure entails resource inputs and potential side effects. This section therefore evaluates the innovation from two perspectives: the positive benefits of farmers' income growth and urban co-benefits, and the potential costs and management challenges. The aim is to provide a balanced assessment of the governance value of this initiative.

5.1. Farmers' Income Structure and Cost Estimation

This subsection offers an empirical estimation of the direct economic impacts of the "Back-Basket Line" on vegetable farmers. Drawing on behavioral patterns documented in media reports, in combination with local market price data and transport fare schedules, we construct a daily cost–benefit model. By comparing travel modes, time costs, and marginal income levels before and after the introduction of the "Back-Basket Line," the analysis seeks to verify the policy's practical effectiveness.

Using *Lao Luo*, a farmer from Gekou Village in Shichuan Town, as a representative case, and based on reasonable assumptions derived from prevailing market prices, the model proceeds as follows:

Table 5-1. Assumptions for Estimating Farmers' Income

Variable	Symbol	Description
Basket weight (kg)	W	Average load per trip: 30 kg (mixed produce such as corn, beans, leafy vegetables, etc.)
Saleable ratio	α	Effective sales efficiency: 90% (≈10% loss due to damage/spoilage)
Average selling price (RMB/kg)	P	Composite estimate: 3.5 RMB/kg (based on Chongqing wholesale market data)
Bus fare (RMB)	C_b	2 RMB (Route 9106, including transfer discount)
Metro fare (RMB)	C_m	6 RMB (Shichuan to Guanyinqiao section)
Total transport cost	C_t	$C_b + C_m$ =8 RMB (one-way), i.e. 16 RMB round trip
Market stall fee	C_S	0 RMB (benefiting from free "Back-Basket" stall policy)
Time cost (hours)	T	Average daily round-trip commuting time ≈ 6 hours
Labor opportunity cost	C_L	Forgone alternative household labor, approximated by local daily wage level
Net daily income	R	$R = \alpha\, W{\cdot}P{-}2C_t$

Assuming W=30 kg, α=0. 9, P =3.5 RMB/kg, the effective sales revenue is:

$$\text{Sales Revenue}=\alpha W\cdot P=0.9\cdot 30\cdot 3.5=94.5\text{RMB}$$

Transport costs (round-trip):

$$C_t=8\text{RMB}(one\text{-}way)\Rightarrow 16\text{RMB}(round\ trip)$$

Net daily income:

$$\text{R}=94.5\text{-}16=78.5\ 元$$

Thus, for each single trip to the city market, a farmer can earn approximately 78.5 RMB of net income per day (excluding depreciation costs). Assuming an average of five market trips per week over 48 weeks annually (≈240 working days), the estimated annual incremental net income is:

$$R_{\text{annual}}=78.5\cdot 240=18{,}840\text{RMB}$$

If farmers expand their production capacity due to improved market access, both transport frequency and total output would rise further. Media reports suggesting annual income increases of 30,000–50,000 RMB corroborate this estimate, underscoring the tangible economic impacts of the "Back-Basket Line."

To assess the marginal impact of the Beilou Express Line's opening, this report compares transportation patterns before and after its launch, measuring time costs, cash expenditures, and travel stability. The data is based on interviews, Chongqing's public transportation fare system, and existing media reports.

Table 5-2. Comparison of Transport Modes Before and After the "Back-Basket Line"

Indicator	Before(Motorcycles/TownshipShuttleVans)	After(FeederBus+Metro)
One-way travel time	≈ 2.5–3.0 hours (including waiting and transfers)	≈ 1.0–1.2 hours (fixed schedule)
One-way cash cost	15–20 RMB (including motorcycle/taxi-sharing expenses)	8 RMB (bus 2 RMB + metro 6 RMB)
Round-trip total cost	30–40 RMB	16 RMB
Accessibility	Highly affected by weather and vehicle availability	Stable, all-weather operation
Safety	High road risks, especially during rain/snow	High, enclosed and regulated train operations
Operational reliability	Frequent delays causing missed "golden" selling hours	High, fixed timetable and punctual service

Time savings:

$$\Delta T = T_{OLD} - T_{NEW} \approx (2.7-1.1)\times 2 \text{ trips/day} = 3.2 \text{ hours/day}.$$

Farmers save more than 3 hours per day, which can be reallocated to extended market sales or supplementary agricultural/labor activities.

$$\Delta C = C_{OLD} - C_{NEW} \approx (35-16) = 19 \text{ RMB/day}$$

On an annual basis (240 working days), this equates to:

$$19\times 240 = 4560 \text{ RMB/day}$$

The metro's high punctuality reduces the risk of delayed arrivals. For perishable crops such as leafy vegetables, a two-hour delay can reduce selling prices by 15–20%. Timely delivery therefore yields implicit but substantial benefits in product freshness and price retention.

Table 5-3. Breakdown of Farmers' Benefit Gains

BenefitCategory	MonetaryValue/Indicator	Explanation
Average daily net income increase	+78.5 RMB	Based on 30 kg basket load, 90% sale ratio, 3.5 RMB/kg, minus transport costs
Annual net income increase	+18,840 RMB	Assuming 240 working days per year
Annual cash expenditure savings	+4,560 RMB	Reduced transport expenses
Time savings	+768 hours/year	Time can be reallocated to longer market hours or additional agricultural production
Price premium effect	+10–20%	Introduction of new varieties increases unit price
Loss reduction rate	≈10% → 5%	Improved transport conditions reduce spoilage
Social intangible effects	Non-monetizable	Enhanced urban inclusivity, stronger rural–urban interaction

Beyond the direct increase in daily net income, the "Back-Basket Line" has generated a range of indirect benefits for both farmers and the city, many of which are characterized by persistence and spillover effects.

At the production end, better transport reduced uncertainty, encouraging farmers to expand cultivation and adopt new techniques. In Gekou Village, over 150 mu of abandoned land was reclaimed and high-yield methods introduced, raising productivity and quality. Market feedback also shifted cropping patterns toward premium varieties such as high-sugar corn and pesticide-free beans, sold at 10–20% higher prices.

For consumers, metro access provided fresher, cheaper "farm-gate produce." Shorter transport times improved quality and taste, while wet markets and new underground markets enhanced shopping experiences. Some even traveled outward to buy directly, creating new rural–urban flows. This circulation benefits consumers economically and narrows social distance.

At the societal level, farmers gained visibility in urban spaces, interacting with consumers as equals. Such encounters foster understanding, reduce prejudice, and enhance the city's inclusive image. The phrase "baskets and briefcases sharing the same train" became a national symbol, boosting Chongqing's reputation.

In sum, the "Back-Basket Line" generates economic gains, agricultural upgrading, consumer benefits, and social cohesion, showing how a low-cost intervention can yield high, sustainable returns.

5.2. Capital Returns, Capacity Allocation, and Reverse Estimation of Farebox Revenues

Within the tension between *efficiency* and *equity* in urban governance, the core challenge of the "Back-Basket Line" does not lie in the absolute size of additional fiscal expenditure, but rather in the dilution of returns on existing capital-intensive infrastructure and the efficiency of capacity allocation [12]. Metro systems represent a typical heavy-asset investment: the unit capital expenditure per kilometer (K) in China's first-tier cities generally ranges from 600 million to 1.1 billion RMB/km [13]. If annualized under an annuity approach with a discount rate of and a lifespan of , the annualized capital occupation per unit length can be expressed as:

$$CapEx_{ann}=K\cdot\frac{r(1+r)^n}{(1+r)^n-1}\approx 0.058K$$

Using an illustrative assumption of K=1 *billion RMB*/*km*, the annualized capital expenditure can be estimated as: $CapEx_{ann}\approx 0.58$ *billion RMB*/*km·year*. Adding operation and maintenance (O&M) costs, which Chinese studies place in the range of 15–35 million RMB/km·year [14], the annual total "cost base" per kilometer is approximately 0.73–0.93 billion RMB/km·year. This implies that any measure reducing average farebox revenue or per-area passenger efficiency effectively dilutes the return on capital employed (ROCE). If the "Back-Basket Line" were to evolve into a rigidly reserved carriage or spatial allocation, its negative financial implications would be tangible.

The financial impact of spatial occupation can be approximated by the passenger equivalent of usable standing area. Design guidelines suggest comfort density at 4–5 persons/m² and peak density at 6–9 persons/m² [15]. If one farmer with a basket occupies ~0.7 m², this is equivalent to ~2.8 passengers at comfort density. With a typical intercity metro fare of 6 RMB in Chongqing's distance-based pricing [16], the potential farebox revenue foregone per trip during peak hours is:

$$Rev_f oregone/trip\approx 2.8\times 6=16.8\ RMB$$

If ~300 farmer trips (one direction) occur daily during peak or quasi-peak hours, the daily farebox opportunity cost is ~10,000 RMB, or ~3 million RMB annually (assuming 300 operating days). Although this "shadow loss" is not directly reflected in subsidy accounts, it lowers average revenue per car-kilometer, thereby downwardly adjusting the system's book capital return.

In addition, congestion externalities may arise. For example, if a carriage capacity is 310 passengers, a 50% increase in farmer riders during peak times could raise crowding levels by 5–7 percentage points. This, in turn, might compel operators to increase service frequency or trainset length, resulting in additional traction energy consumption and staffing costs [14].

At a macro level, deploying a high-capital-density transit mode such as metro to carry low-margin, small-batch agricultural produce inevitably lowers system-wide ROCE and farebox recovery ratio (FRR)—particularly in Chongqing, where metro construction costs are among the highest nationally [13].

However, urban rail capacity curves exhibit strong temporal and spatial variation. On Line 4, for instance, average daily ridership in 2023 was under 70,000 passengers [17], far below the 600,000+ typical of trunk lines, indicating considerable redundant capacity in specific time windows and segments. When the "Back-Basket Line" primarily operates in non-peak windows (early-morning inbound, near-midday outbound), without rigidly reserved cars, the above farebox substitution can be substantially discounted. Assuming a peak overlap ratio of 0.2, the annualized farebox opportunity cost falls to ~0.6 million RMB—effectively at the level of statistical noise compared to the unit cost base of 0.73–0.93 billion RMB/km·year [14].

In summary, under conditions of surplus capacity, trading low marginal costs for inclusive welfare is a rational choice. Nevertheless, minimizing impacts on capital returns and farebox recovery requires careful scheduling outside peak periods and the adoption of soft behavioral regulations rather than rigid spatial reservations.

6. A Mechanistic Framework Centered on "Inclusive Service Units (ISU)"

6.1. Capturing "Urban Warmth" through a Social Welfare Increment Function

Conventional invocations of *human-centeredness* or *inclusive sharing* risk remaining at the level of normative slogans, lacking entry points for policy evaluation and scholarly falsification [25,29]. To render these ideas auditable, comparable, and testable, this report translates "governance warmth" into a social welfare increment function, placing direct and indirect benefits, as well as explicit and implicit costs, within a unified accounting framework [19,20,31]:

$$\Delta W = \underbrace{\Delta\Pi_{\text{farm}} + \Delta CS_{\text{urban}} + \Delta S_{\text{inclusion}}}_{\text{Benefits: Vegetable farmers' profits, urban consumer surplus, inclusion/trust gains}} - \underbrace{\Delta OC_{\text{ops}} + \Delta K_{\text{ann}} + \Delta R_{\text{farebox}} + \Delta N_{\text{external}}}_{\text{Costs: Operation and maintenance, annualized capital, opportunity cost of ticket boxes, negative externalities}}$$

Where:

- $\Delta\prod_{farm}$: incremental farmer profits, derived from the daily/annual income model in Section 5.1.
- ΔS_{urban}: change in consumer surplus, estimated via price–quantity data and substitution cost of alternative channels [19,20].
- $\Delta S_{inclusion}$: inclusivity gains, proxied by accessibility improvements for vulnerable groups (e.g., reduced travel time and variance for farmers), survey scores on trust/tolerance, or complaint rates, aggregated through principal component scoring [27].
- $\Delta R_{\text{farebox}}$: "shadow farebox substitution" estimated in Section 5.2, proportionally discounted by peak overlap ratio ϕ.
- $\Delta N_{\text{external}}$: marginal costs of negative externality management, proxied by cleaning frequency, staff guidance, and congestion threshold indicators.

If verified slack capacity exists in off-peak windows, and if soft constraints (time slots, quotas, packaging/cleanliness rules) keep externalities within operational thresholds, then the condition $\Delta W > 0$ can be empirically satisfied [3,14].

Furthermore, equity-weighted cost–benefit analysis (CBA) may be introduced by applying distributive weights wgw_gwg to reflect welfare sensitivity for lower-income groups [19,36]. This extends the ISU framework beyond aggregate efficiency, incorporating distributive justice into the evaluation.

$$\Delta W^* = g \sum w_g\ \Delta U_g - \left(\Delta OC_{\text{ops}} + \Delta K_{\text{ann}} + \Delta R_{\text{farebox}} + \Delta N_{\text{external}}\right), \quad w_g \propto y_g^{-\eta}$$

Where y_g denotes the income level of group g, and η is the inequality-aversion parameter [36]. This formulation allows for explicit trade-offs along the efficiency–equity frontier, thereby giving the normative appeal of "urban warmth" a quantifiable and comparable empirical meaning.

6.2. Designing Inclusive Service Units (ISU) and Institutionalized Flexibility

The substantive innovation of this case does not lie in a one-time redistribution of welfare, but rather in translating the *idle capacity of high-capital-density infrastructure during off-peak periods* into low-marginal-cost services for vulnerable groups. Based on this logic, the report proposes the Inclusive Service Unit (ISU) mechanism, consisting of four interdependent design elements:

- Verified Slack: Admission is conditional upon metrics such as line/period passenger load factor, crowding thresholds, and peak overlap ratio (ϕ). When both ϕ and crowding levels fall below threshold, the admissible service window opens [20,31].
- Low-Interference Embedding: Rejecting rigidly reserved carriages, the model instead relies on flexible quotas

combined with behavioral norms (e.g., basket size/packaging requirements, designated boarding stations, dispersed entry points) to mitigate $\Delta R_{\text{farebox}}$ losses and congestion externalities [21,24].

- Micro-Cost Offsetting: Order and hygiene externalities are countered by minimal additional inputs—such as "1–2 extra staff for guidance around peak hours and one supplementary cleaning session." These recurring micro-costs are integrated into routine budget lines rather than treated as ad hoc special expenditures [20,24].
- End-to-End Closure: Feeder bus services and legalized market spaces (e.g., "Back-Basket Zones," "time-bounded markets") are paired with the metro access, preventing disorder pressures from spilling over into street or neighborhood governance [22,23].

The ISU's governance logic is one of "rule-based flexibility." At the regulatory level, soft law instruments and standard operating procedures (SOPs) define service windows and carriage norms. At the organizational level, "small task forces plus cross-departmental rapid response" institutionalize coordination routines. At the public discourse level, transparent key performance indicators (e.g., crowding ratios, complaint rates, transaction density, cleaning frequency) substitute for purely moralistic narratives [22,23,24].

This model of institutionalized elasticity avoids the unsustainability of exceptionalist governance, embedding "urban warmth" into an auditable framework of institutional engineering.

6.3. Testable Propositions and Identification Strategies: From Narrative to Falsifiable Inference

To meet the academic expectation of "mechanistic clarity—falsifiability—explicit external validity," this report formulates four testable propositions with corresponding identification strategies (all implementable via open metro data, market transaction records, and operational logs):

- Proposition P1 (Marginal Fiscal Cost): In off-peak windows with $\phi \leq 0.2$, the annualized "shadow farebox substitution" ($\Delta R_{\text{farebox}}$) does not exceed 0.1% of the unit cost base (capital amortization + O&M). Identification may use segmented DID (redundant vs. non-redundant sections) to estimate post-policy changes in $\Delta R_{\text{farebox}}$, or employ synthetic control methods using comparable non-ISU lines [18,20,31].
- Proposition P2 (Unit Fiscal Efficiency): Under end-to-end closure conditions, the ratio $\Delta\prod_{farm}$ /Public Expenditure is significantly higher than the median quantile of other subsidy-based programs in the same city (denominator includes bus subsidies, micro-renovations, sanitation staffing, etc.). Identification relies on fiscal accounts and micro-level income estimates to construct horizontal comparisons of "unit fiscal efficiency," with robustness checks against outliers [19,20].
- Proposition P3 (Order Externalities): With soft constraints in place, post-implementation changes in crowding levels and complaint rates are statistically insignificant ($|\Delta| \leq 5\%$), and variance is explained primarily as a linear function of cleaning frequency and staff guidance numbers. Identification may use panel regressions controlling for weather, holidays, or construction, or apply an RDD at the "first-train threshold" to capture immediate effects of procedural change [20,24,28].
- Proposition P4 (Industrial Spillovers): After more than six months of continuous ISU implementation, reclaimed farmland area and the share of premium-crop varieties exhibit significant monotonic increases, forming Granger-causal links with urban transaction density. Identification may use dynamic panel models of county/village agricultural data and market logs, supplemented with instrumental variables (e.g., meteorological shocks, temporary transport disruptions) to strengthen exogeneity [24,33].

These propositions provide clear operational pathways for cross-city comparison and quasi-experimental research, enabling the rhetorical notion of "urban warmth" to be translated into falsifiable empirical conclusions.

6.4. Contextual Boundaries and Policy Toolbox: When Not Replicable, When Preferentially Adopted

The "Back-Basket Line" model of inclusive service units is not universally transferable across cities or time periods. Its external validity and sustainability depend on careful delineation of contextual boundaries and the design of protective governance safeguards.

First, from a capacity perspective, if a target line operates under long-term saturation (e.g., peak-section load factors consistently above 85%), ISU implementation significantly raises farebox substitution costs ($\Delta R_{\text{farebox}}$) and congestion externalities, imposing time and comfort losses on other riders. In such cases, priority should be given to peak-offset special trains, temporary trainset extensions, or modest peak–off-peak fare differentials to mitigate negative impacts [31].

Second, spatial matching is crucial. When production sites and core consumer markets are separated by long chain-links requiring multiple trunk-line transfers, transport uncertainty, closure costs, and order risks escalate sharply. In such contexts, functionally equivalent but shorter-path alternatives (e.g., suburban market buses, seasonal farmers' markets, or temporary wholesale depots) offer more cost-effective solutions [25,27], relieving pressure on the metro system while retaining direct rural–urban supply functions.

Third, policymakers must guard against the risk of institutional ossification. Designing rigid, long-term reserved carriages or seats can trigger "privilege" controversies and erode public support for inclusionary policies. Instead, soft constraints (e.g., quotas, time-window access, packaging/cleanliness rules) should replace hard entitlements, maintaining reversibility and flexibility. This prevents capture by interest groups and allows rapid adaptation to shifts in passenger flows or economic conditions [24].

From these contextual constraints, four transferable design principles can be distilled:

1. Redundancy First: Prior to ISU introduction, disprove the "no slack" hypothesis through data analysis, ensuring available capacity. Admission thresholds may be based on segment load factor, crowding limits, and heat-map demand distribution [20].
2. Embedded Soft Constraints: Predefine quotas, time windows, and packaging/cleanliness norms to lock externalities within manageable bounds, minimizing additional O&M burdens [24].
3. End-to-End Coordination: Co-deploy feeder services and legal sales spaces, forming a closed loop from travel to trading, preventing disorder costs from spilling over into street or community systems [22,23].
4. Performance Visibility: Establish a rolling evaluation system centered on the ΔW scorecard, covering indicators such as farebox substitution, complaint rates, reclaimed land, and transaction density. Legitimacy and public support are thus sustained through data rather than narrative.

This toolbox-oriented thinking, grounded in contextual boundaries, helps determine when ISU adoption is appropriate and when functionally equivalent alternatives are preferable. It provides other megacities with a replicable decision framework to dynamically balance cost constraints and social inclusion[37].

7. Conclusion

This report takes Chongqing's "Back-Basket Line" as its central case to explore the theoretical trajectory of *human-centeredness—inclusive sharing—governance modernization*. It demonstrates how a small-scale livelihood intervention can, at the margin of existing infrastructure, achieve the low-cost expansion and institutional embedding of public services. Methodologically, it integrates qualitative case study, "governance community" stakeholder analysis, and cost–benefit estimation. The study reconstructs the full operational chain—from rural departure, to metro boarding, to urban sales, to iterative feedback—while also quantifying the resource allocation logic within the efficiency–equity tension. In so doing, it seeks to translate the notion of "urban warmth" from normative rhetoric into an auditable and comparable empirical object.

At the case level, Chongqing's innovation lies in **end-to-end co-design**: feeder buses for the "first kilometer," metro measures (early station opening, handheld checks, designated carriages, dialect announcements) to reduce friction, and urban outlets (free "Back-Basket Zones," underground markets) to legitimize sales. Continuous iteration—widened stairways, lighting, drainage—shows adaptive refinement. These lower suppliers' access costs, improving "people–goods–venues" matching without new heavy assets.

Quantitatively, a farmer's net daily gain reaches ~78.5 RMB (~18,840 annually); cash savings ~4,560 RMB/year; and

~768 hours saved, with reduced spoilage and quality premiums. Marginal expenditures (early opening, cleaning, space) are manageable, and off-peak embedding renders farebox costs negligible. Relative to ~0.73–0.93 billion RMB/km·year cost bases, impacts mainly dilute returns, not fiscal burdens. This supports the policy claim: verified redundancy and low marginal costs can yield equity-sensitive welfare increments.

The study introduces the **Inclusive Service Unit (ISU)** framework, which converts off-peak redundancy in high-capital networks into institutionalized services. ISU applies a social welfare increment function (ΔW), extendable with equity weights, unifying farmer profits, consumer surplus, and inclusivity gains against O&M and capital costs. Four design elements—verified slack, low-interference embedding, micro-cost offsetting, end-to-end closure—plus four falsifiable propositions (marginal cost, unit efficiency, order externalities, spillovers) enable cross-city comparative research.

Applicability depends on context: ISUs are unsuitable under chronic saturation or wide production–market gaps, where alternatives (special trains, differential pricing, market buses) work better. To avoid ossification and privilege debates, **soft constraints** (quotas, time windows, cleanliness) should replace entitlements. Rather than romanticizing, ISU is a **policy toolbox**: rolling scorecards using ΔW track farebox substitution, complaints, farmland recovery, and density—legitimacy rests on data, not moral narrative.

Limitations include heterogeneity in crops, seasonality, and price elasticity, requiring higher-frequency trade and flow data. Externalities and passenger experience demand multimodal micro-sensor and complaint analysis; causal inference benefits from synthetic control or discontinuity methods. Future research could test ISU's coupling with employment, community commerce, or emergency supply, enriching governance explanations of "incremental equity within stock infrastructure."

Overall, the "Back-Basket Line" illustrates a shift from values to institutional engineering: inclusivity as objective, governance modernization as method, redundancy and soft regulation as constraints. Its value lies not in exceptionality but in **replicability, measurability, and falsifiability**. Embedding such micro-innovations into routine evaluation may help megacities sustain "urban warmth" under constraints.

Disclosure statement

The author declares no conflict of interest.

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