

Social Return on Investment (SROI) of SIT-Flexi in the Central Region of Portugal

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1. Objective and Contribution

Mobility provision in low-density territories represents one of the most persistent structural challenges in regional development and transport policy. Conventional fixed-route public transport systems frequently operate with low load factors and high marginal costs in dispersed settlements, often resulting in reduced frequency or service withdrawal. This dynamic contributes to territorial inequality, social isolation, and limited access to essential services, particularly among ageing populations (Mageean & Nelson, 2003) (Mulley & Nelson, 2009).

Demand-Responsive Transport (DRT) systems have emerged as adaptive mobility solutions capable of reconciling accessibility and operational efficiency (Ferreira et al., 2007). Beyond operational performance, however, contemporary mobility debates increasingly emphasize sustainability and circularity. On-demand systems align supply with actual demand, thereby reducing unnecessary mileage and improving resource efficiency, consistent with circular economy principles (Ellen MacArthur Foundation, 2015) (Saidani et al., 2018).

Despite these advantages, traditional transport evaluation frameworks remain largely focused on financial sustainability. In rural and ageing territories, the value of mobility extends beyond fare revenue; it encompasses healthcare access, autonomy, social participation, and territorial cohesion. To capture these multidimensional impacts, Social Return on Investment (SROI) provides a structured methodology for monetising social, environmental, and economic outcomes within a unified framework (Nicholls, 2017) (Maier et al., 2015).

This study applies SROI to SIT-Flexi, an on-demand transport service operating across 18 municipalities in the Coimbra Region (Portugal). It contributes to the literature by:

- Providing one of the first SROI applications to DRT services in Southern Europe;
- Integrating environmental modelling (COPERT) within a social value framework;
- Framing flexible mobility as a practical expression of circular economy principles in low-density territories.

2. Conceptual Framework

2.1. Flexible Transport and Territorial Cohesion

Flexible Transport Services (FTS) and DRT have been widely discussed as viable alternatives in low-density contexts where conventional systems are financially unsustainable (Mageean & Nelson, 2003) (Mulley & Nelson, 2009). Operational effectiveness depends on institutional coordination, booking systems, and vehicle allocation adapted to dispersed demand (Koffman, 2004) (Ferreira et al., 2007).

European case studies demonstrate that DRT systems enhance accessibility and support social inclusion in rural territories (Wright et al., 2009) (RCTP, 2012).

2.2. Circular Economy and On-Demand Mobility

The circular economy paradigm emphasizes resource efficiency and the minimization of waste (Ellen MacArthur Foundation, 2015). In transport systems, flexible and shared mobility reduce underutilized capacity and unnecessary kilometers travelled (Saidani et al., 2018). On-demand transport therefore represents not only a logistical innovation but also a systemic shift toward adaptive and efficient mobility provision (Nuno Marques Costa, 2021).

2.3. Social Return on Investment

SROI quantifies the social value generated relative to investment costs. Unlike conventional cost-benefit analysis, it incorporates non-market outcomes, stakeholder perspectives, and corrective mechanisms such as deadweight and attribution (Nicholls, 2017) (Arvidson et al., 2013). While SROI enhances transparency and policy communication, it also faces methodological challenges related to proxy selection and comparability (Maier et al., 2015) (Pathak & Dattani, 2014).

Applications to flexible transport initiatives in Scotland, Ireland, Northern Ireland, and the United States report positive SROI ratios, ranging from 2:1 to above 10:1 depending on scope and valuation breadth (Wright et al., 2009) (RCTP, 2012) (Vantastic, 2019) (Maleki and Smith-Colin, 2023).

3. Case Study: SIT-Flexi

SIT-Flexi is a demand-responsive transport service implemented by the Intermunicipal Community of the Coimbra Region (CIM-RC). The service operates exclusively via advance booking and is delivered through licensed taxi operators under a hybrid funding scheme combining user fares and public subsidies (Regulamento da CIM-RC, 2024).

The Coimbra Region covers approximately 4,336 km² and includes both urban and

sparsely populated inland territories. Despite overall penetration rates below 1% of the resident population, usage is higher in municipalities characterized by lower population density, reinforcing its targeted territorial relevance.

Survey data (n = 100) reveal that 71% of users are aged 65+, and 81% are women. The majority use the service for healthcare access and essential services. These characteristics indicate that SIT-Flexi primarily serves vulnerable elderly populations rather than functioning as a mass transit alternative.

4. Methodology

Table 1 summarises the analytical framework adopted to operationalise the SROI assessment. Four core impact dimensions were considered: direct user savings, public health savings, caregiver time savings, and environmental externalities. For each metric, the table identifies the outcome measured, the data sources used, the monetary proxy applied, and the adjustments incorporated to ensure conservative estimation.

The monetisation strategy combines survey evidence, operational data, official statistics, and internationally validated financial proxies. Standard SROI corrections—namely deadweight and attribution—were applied to the social metrics to avoid over-claiming impact. Environmental externalities were calculated using emission modelling and reference values from the European Commission’s external cost framework, updated to 2025 price levels.

This structured approach ensures transparency in the valuation process and strengthens the robustness and comparability of the final SROI ratio.

Table 1 - Summary of SROI Metrics and Assumptions

Metrics	Impact Measured	Data Source	Monetary Proxy	Adjustments Applied
Direct user savings	Difference between SIT-Flexi fare and taxi alternative	User Survey; Official taxi fare in Portugal; SIT-Flexi fare.	Average taxi fare per km	
Public health savings	Avoided missed medical appointments	User Survey; Health Statistics.	Cost per missed consultation (National Health Service (United Kingdom))	Deadweight and attribution

Time savings for caregivers	Reduced informal care time	User Survey; Average salary in Portugal.	Average hourly wage	Deadweight and attribution
Environmental impacts	Avoided CO2 and air pollution costs	Operational data; EU external cost manual.	External cost values (updated ×1.3 to 2025 prices)	

5. Results

Table X presents the aggregated results of the SROI analysis, summarizing the net annual benefits obtained for each metric, the total social value generated, the total adjusted cost of the service, and the resulting SROI ratio.

The results indicate that SIT-Flexi generates a total annual social value of €279,712.20, distributed across five impact dimensions. The social inclusion and reduced isolation metric (€56,551.50), reflects the relevance of mobility access for elderly and socioeconomically vulnerable users in low-density territories. Direct user savings represent the second most significant contribution (€73,613), followed by public health savings (€18,671), caregiver time savings (€16,250), and monetized environmental benefits (€7,083).

After adjusting the total annual operational cost to exclude statutory school transport obligations, the effective cost of the service amounts to €160,884.96. Comparing total social value with total cost results in an SROI ratio of 1.07:1.

This means that for every €1 of public investment, SIT-Flexi generates €1.07 in measurable social and environmental benefits. The ratio confirms that the service produces net positive social value even under conservative assumptions, including the application of deadweight and attribution adjustments and the exclusion of long-term or psychological impacts.

The distribution of benefits further suggests that the primary contribution of SIT-Flexi lies not only in economic savings but in strengthening social inclusion and territorial cohesion, reinforcing its role as a targeted policy instrument for ageing and rural regions.

Table 2 - Aggregate SROI Results

Metrics	Metric 1 (€)	Metric 2 (€)	Metric 3 (€)	Metric 4 (€)	Metric 5 (€)	Total Social Value (€)	Total Cost of Service (€)	SROI
Benefit	73.613	18.671	16.250	56,551.50	7.083	172,168.50€	160,884.96€	1,07

6. Conclusion

The SROI ratio of 1.07:1 confirms positive net social value. Although lower than international cases such as T2E in Scotland (~3:1) (Wright et al., 2009) or RCTP in Northern Ireland (12:1) (RCTP, 2012), the more moderate ratio reflects a deliberately conservative methodological scope.

Unlike studies incorporating long-term psychological outcomes (Vantastic, 2019) (Maleki and Smith-Colin, 2023), this analysis restricts monetization to directly observable and quantifiable impacts. Standard deadweight and attribution adjustments further reduce overestimation.

Thus, the ratio should be interpreted as a prudent baseline rather than a maximum potential estimate.

7. Conclusions

This study demonstrates that demand-responsive transport systems can transform public expenditure into measurable social value in low-density territories.

Even under conservative assumptions, SIT-Flexi produces a positive SROI of 1.07:1, confirming its relevance as a policy instrument for:

- Territorial cohesion;
- Social inclusion;
- Sustainable resource use;
- Ageing population mobility.

Future research may incorporate longitudinal well-being indicators, sensitivity analysis across proxy scenarios, and scalability modelling.

Overall, flexible mobility systems such as SIT-Flexi illustrate how adaptive transport policies can support socially just and environmentally responsible regional development.

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