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Drivers and barriers to sustainable mobility: lessons learnt from GEF projects in Russia, Central Asia and Caucasus

Ángel Aparicio*

Universidad Politécnica de Madrid, Escuela de ingenieros de caminos, Av. Profesor Aranguren, 3, 28040 Madrid, Spain

Abstract

Sustainable mobility has been actively supported by multilateral agencies like UNDP, inter alia, through the Global Environmental Fund (GEF). This paper reviews the implementation of sustainable transport concepts in Russia and other countries of the former Soviet Union by UNDP in the last decade. Beyond sharp differences in terms of development, these countries share a relatively recent attention to the sustainable mobility paradigm familiar to the global community.

UNDP projects have been relevant to disseminate sustainable urban mobility concepts among local stakeholders and decision makers, to improve communication between local practitioners and the global community, and to gain access to some modern tools for transport analysis and transport management.

Some shortcomings common to all projects suggest that the approach is withered by some bias: in the first place, a program bias, which leads to establish overambitious targets linked to GHG reduction, leaving aside key mobility and social aspects with no impact on GHG emissions; secondly, a sectoral bias, which tends to keep the project within a *transport sector bubble*, which is unlikely to mobilize a wider array of stakeholders, and thirdly a technological bias, which tends to focus implementation efforts on technical measures rather than on governance and regulatory reforms. Nevertheless, projects have generally been successful. In particular, projects have served to put pedestrians in the local agenda and in professional practice; they have also provided a better understanding of the technological issues at stake in the promotion of clean vehicles; and most interestingly, they have contributed to recover the central role of public transport systems in urban mobility and to increase the support of local decision makers.

The approach to transport in future could build upon this experience with a shift from the current climate and economic focus, towards social issues within GEF/UNDP projects, and more attention to the institutional and regulatory reforms.

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* Corresponding author. Tel.: +34 910 674 227.

E-mail address: angel.aparicio@upm.es

1. Introduction

Sustainable mobility has been actively supported by multilateral agencies and IFIs, inter alia, through the Global Environmental Fund (GEF). This paper reviews the implementation of sustainable transport concepts in Russia and other countries of the former Soviet Union. Beyond sharp differences in terms of development, these countries share a relatively recent attention to the sustainable mobility paradigm familiar to the global community.

UNDP is one of the international agencies active in the region, and has implemented in the last decade various projects financed by the Global Environment Facility (GEF). These projects have been relevant (1) to disseminate sustainable urban mobility concepts among local stakeholders and decision makers, (2) to increase contact between local practitioners and the global community of urban mobility professionals, (3) to gain access to some modern tools for transport analysis and transport management. The objective of the paper is to assess the impact of these projects, and to identify opportunities to push forward sustainable urban mobility in the region.

The paper is organized in five sections, besides this introduction. Section one presents the general approach of UNDP/GEF projects. Section 2 provides a general analytical framework to these projects, covering three levels: the general program level, the sectoral transport level, and the particular measure level. Section 3 summarizes the main trends and challenges of urban mobility in CIS cities, including questions such as the positive image of cars, which leads to car-facilitation policies, the sharp decline of public transport systems, and the controversial role of informal transport and ride services. Section 4 reviews the main contributions of the UNDP/GEF projects in the region, following the analytical framework. Section 5 concludes and provides some recommendations for future action.

2. The approach of UNDP/GEF projects

The Global Environmental Facility (GEF) Trust Fund is a small source of finance for environmental projects. It was established on the eve of the 1992 Rio Earth Summit, with financial contributions from donor countries, and is replenished every four years. GEF funds are available to developing countries and countries with economies in transition. The World Bank serves as the GEF Trustee, administering the Fund, and disbursing funds to the GEF Agencies, which create project proposals and implement them on the ground. The GEF Trust Fund has steadily grown from USD 2 billion in the first period (GEF-1, 1994-1998) to USD 4.43 billion in the current period (GEF-6, 2014-2018) (GEF, 2015).

GEF funds are allocated to so-called focal areas, which are established for each period through programming strategies. The focal areas under the current period (GEF-6) are the following ones: biodiversity, climate change mitigation, chemicals and waste, international waters, land degradation, and sustainable forest management. There are also three additional areas aiming at integrating approaches in cities, deforestation and food security, as well as a number of corporate programs funding support work in the focal areas and ensuring coherence among them.

Under GEF-6, and also in the previous GEF-5 period, sustainable urban transport is articulated under the climate change mitigation (CCM) focal area. Whereas GEF-5 included one specific objective in transport (Promote energy efficient, low-carbon transport and urban systems), GEF-6 includes three general objectives, without particular reference to transport or to any other sector. These objectives refer to (1) promote innovation, technology transfer, and supportive policies and strategies; (2) demonstrate systemic impacts of mitigation options, and (3) foster enabling conditions to mainstream mitigation concerns into sustainable development strategies. The change in approach to climate change mitigation from GEF-5 to GEF-6 responds to an attempt to encourage more integrated, cross-sectoral approaches in projects. The new area on “sustainable cities” follows the same strategy. (GEF 2016a, 2016b).

GEF agencies prepare proposals on an “incremental financing” basis. The bulk of the project is financed by other sources (generally local and national governments, and eventually the private sector or other donors) GEF funds can be requested only for additional activities in the project, which would not be undertaken without GEF support and which clearly contribute to GEF objectives. Projects have usually been experimental and of a catalytic nature. Project components have often included BRT systems or other forms of public transport priority or restructuring, and support to walking and cycling (non-motorized transport, NMT), together with many other activities: capacity building, land use and transport integration, awareness raising, travel demand management, legislative reforms or traffic planning and management (ITDP, 2013).

The proposal preparation and approval procedure is challenging and time-consuming, and has been further complicated as GEF has attempted to implement recommendations from the assessment of past periods and to impose the use of common tools (such as the TEEMP model for estimating GHG emission savings from projects), and project logics (common problem tree analysis and project logical frameworks). Another key challenge is the involvement of the relevant local stakeholders and their co-financing. Long approval periods (two years or more) result in significant contextual differences between the first project inception and the start of actual implementation. Project implementation usually takes 3 to 5 years. GEF contribution to UNDP transport projects vary in the range of less than USD 1 million to something above USD 10 million, depending on the project's ambition and contents.

UNDP is one of the eighteen institutions acting as a GEF implementing agency. The comparative advantage of UNDP lies in its extensive network of country offices, and its experience in integrated policies, institutional strengthening, and non-governmental and community participation. The experience of UNDP in the transport sector started in 1992, with the first concept of a project in Pakistan during the pilot phase prior to the official launch of GEF (project 391: Fuel Efficiency in the Road Transport Sector); the project was approved in 1996, but did not start until 2001, and finished in 2005. This was followed by one project under GEF-2, four projects under GEF-3, nine projects under GEF-4, nine projects under GEF-5 and three projects, thus far, under GEF-6.

The governance structure of GEF/UNDP projects includes a national or local government institution, acting as the executing agency, a project management board and a project team. The project contents are defined at the initial design stages. These projects typically run for 3 to 5 years, and a short extension is possible under some conditions.

Contrary to other initiatives, such as the European Union's CIVITAS initiative supporting pilots on urban mobility since 2002 (Schwedes et al, 2017), neither GEF nor UNDP have made concrete efforts to support networking among urban transport projects. Projects are monitored by UNDP regional offices, offering some opportunities to cross-fertilization among them, although not particular formal instruments have been established for this.

3. The analytical framework

UNDP encourages applicants to follow the theory of change (ToC) approach to project preparation. This starts by developing a problem tree analysis to understand the mechanisms and causal chains behind the core problem a GEF-financed project has to address: the growth of GHG emissions from urban transport (UNDG, 2017). The theory of change is a planning instrument that intends to focus on those actions that will implement the necessary reforms to move towards a desired situation. ToC originated in disciplines such as environmental and organizational psychology in the 1990s, and moved quickly to sociology, including community development, sociology and political science. Weiss (1995) was one of the first in using this term.

In UNDP/GEF projects, the ToC and the problem-tree analysis can be seen as the two sides of the coin. The problem-tree analysis serves to identify the mechanisms that explain the growth in GHG emissions from urban transport. The theory of change can subsequently be applied to act on some of those causal links, with the result of achieving a certain reduction in such emissions.

The ToC approach has the advantage of focusing the project's resources on those actions with a higher potential to contribute towards the stated objective, considering the project's resources. However, this efficiency-based approach may come at the cost of over-simplifying the complexity of the socio-economic context in which the urban transport system operates. Typically, the urban transport system can contribute to objectives related to health, social cohesion, and economic competitiveness. Furthermore, the urban transport system may have a significant impact in the quality of the built space. Last but not least, urban transport activities may be the source of environmental impacts well beyond the GHG emissions, including air quality, noise, or end-of-life vehicle disposal.

To understand how this methodological approach shapes the structure and contents of all the projects reviewed, an analysis can be undertaken following three basis questions: (a) how are the project objectives formulated, i.e., which is the problem to solve and how this problem is understood; (b) which are the boundaries of the transport project and how are they established (physical, administrative, institutional, functional...); (c) which is the profile of the measures selected and their innovative (technological or not) content, i.e. how much effort they have received, and what has been delivered.

The first question is better placed at the whole GEF/UNDP program level. GEF projects are primarily targeting a reduction in GHG emissions. However, in many cases, these projects will also have environmental, health, economic

or physical impacts which can contribute or jeopardize the attainment of public policy objectives on these fronts. Accordingly, it seems relevant to identify key social, economic, physical or environmental challenges in cities that may interfere with the GEF/UNDP project's approach. It is worth noting that UNDP has been aware of these limitations, and has tried to address these limitations through the preparation of reports on the social and environmental assessment of transport projects, starting in GEF-6 (UNDP, 2016a, 2016b). However, this approach did not affect the transport projects assessed in this paper, which do not include a social impact assessment.

The second question can be better addressed at the transport sector level. The ToC approach imposes a particular definition of the project's boundaries, focusing on the urban transport sector in the targeted city. Setting these boundaries is appropriate considering the size of the project, but leaves outside certain stakeholders and other public policies, which may be relevant in a comprehensive, integrated mobility concept. Analyzing the stakeholders and policies involved in (and excluded from) the project serves to better understand the success (and failure) during implementation. Obviously, a wide involvement of stakeholders and policies would increase the potential of the project, but at the high costs of management and decision-making complexity and of moving towards a long-term perspective, with limited results in the short term. On the other extreme, a narrow approach limited to the transport dimensions in the project are unlikely to achieve the expected transitional changes towards sustainable mobility, as it will lack proper consideration of key drivers (economic, psychological, sociological...) in mobility behavior.

The third question refers to the measures included in each project. The ToC analysis results in the selection of those measures, which should provide the expected reduction in GHG emissions. The selection of measures combines the assessment of their potential impact with considerations on their feasibility, taking into consideration the stakeholders involved, and the resources that can be mobilized. A key consideration in measure selection is the feasibility to implement it during the project life, usually 3 to 5 years. The transferability of measures from other cities, and the implementation of technological innovations are likely to influence the selection of measures during project design.

This analysis may help to identify possible bias in the approach to sustainable mobility at three levels: at the program level (i.e. the GEF/UNDP general approach), at the policy level (isolating transport from other related public policies), and at the project design level (favoring the selection of measures with a certain profile). The review of various transport projects in cities within the Commonwealth of Independent States (CIS) will provide some light on how UNDP/GEF projects have influenced and changed urban transport policies, and will also serve to identify the constraints of these projects at the three levels mentioned above.

4. The particular context of mobility in CIS cities

Thus far, four urban transport projects have been implemented in the CIS region by GEF/UNDP. Three of them were designed and approved under GEF-4 and one of them under GEF-5. The target cities in Kazakhstan (Almaty), Russia (Kaliningrad and Kazan), Tajikistan (Dushanbe) and Georgia (Batumi). Furthermore, two projects developing Nationally Appropriate Mitigation Actions in Azerbaijan and Kazakhstan under GEF-5 also include some transport-related components.

All the projects were designed at the end of the past decade, once cities have successfully moved forward from the difficult times of the transition period in the 1990s and beginning of the XXI century. It is worth recalling that cities in the Soviet Union were planned with quite specific features. Big housing complexes were typically established at the edge of the city, far from places of employment which tended to be concentrated in city centers, including an unusually high proportion of industrial jobs (Bertaud and Renaud, 1994). This pattern imposed long daily radial home-work journeys, served by public transport modes. Non-motorized transport (NMT) did not play a relevant role in this urban pattern. The population's reliance on cheap public transport was compromised in the 1990s when central governments, after independence, decentralized the responsibility of transport and many other urban service provision to cities, without providing the necessary funds. The impact was particularly relevant in urban public transport. Service providers were city-owned enterprises, already with severe problems such as old fleets with high fuel consumption and maintenance, and over-staffing in their administrative departments. (WB, 2002).

Most of these companies, facing low cost-recovery levels, could not move fast enough to increase fares, to compensate decreasing governmental funding. This resulted in further deterioration of quality of service, and to the loss of passengers, moving to second-hand imported cars or to the new services offered by informal operators, seizing the opportunities created by liberalization of economic activities. The marshrutkas, minibuses that had originally

appeared in Soviet times in some cities to serve low-demand routes as a support to public transport networks, became ubiquitous, many times competing even in the main public transport routes. On its turn, the proliferation of marshrutkas led to a surge in traffic with increased congestion, accidents and pollution (WP, 2002).

The process of recovery from this dim situation was different among countries and among cities. In the most critical cases, the public transport system was all but dismantled: drivers were asked to bear the demand risk: paying a fixed daily amount to the public transport company and keeping the additional fare revenue they could raise as a bonus to their meagre salaries. In other cases, marshrutkas were integrated in the public transport network, with fares, routes and headways established by the municipality.

Cities have struggled to move away from this mobility crisis. The UNDP/GEF project documents provide a good picture of this transition. The current situation, although with significant differences among cities, has some commonalities:

- Moderate, but rapidly growing GHG emissions from transport. Car use and travel distances remain low in CIS cities, but they face rapidly growing motorization rates.
- Largely neglected PT systems, needing huge investments to regain reasonable quality standards. However, the degree of deterioration is far from uniform.
- Extensive, although shrinking, networks of informal transport, which are being regulated and progressively re-integrated within the public transport system, although with large differences among countries.
- Generally poor conditions for walking and cycling, which keep receiving scant attention from local technicians and decision makers.
- Authoritarian governance regimes, and weak civil society participation. Once the mobility crisis has been left behind, transport improvements are not a priority for decision-makers, and are left to civil servants, usually split into a multiplicity of technical municipal departments. The strong top-down culture in municipalities favors risk-averse attitudes, avoiding to address conflictual challenges and to develop what can be perceived as controversial measures. Daily management of traffic congestion becomes the top priority.
- Social challenges, with transport as a growing driver of social segregation. As public transport fares have increased, service quality has deteriorated and some lines serving distant districts have been closed or reduced, low-income residents find it difficult to move from their neighborhoods, and to reach certain destinations. A trend further strengthened by the emerging urban development patterns, with new commercial and office space difficult to access from those districts. For those without a car, informal services are an option, if they can afford the higher fares they charge, and do not need in poor areas, that informal services have little interest in serving.
- The sharp blighting and slow recovery of public space in cities, outside the more central areas, which further discourage NMT use.

5. Contents and limitations of the GEF approach in the region

5.1. General: The program level

In accordance with the “problem tree” approach of GEF/UNDP, the main challenge to address is the growth of GHG emissions from urban transport. Although usually combined with other challenges, this issue is familiar in transport planning since the 1990s, and has developed a fruitful discussion on the options to address it. The literature usually establishes three different categories: avoid trips or reduce trip distances, for example through changes in land use patterns and use of ITCs to access services and jobs without travelling; shift to transport modes with lower GHG emissions, and improve the environmental performance of transport means with more efficient vehicle technologies. (Dalkmann & Brannigan, 2007).

At the UNDP/GEF project design stage, the specialists will choose, in interaction with local stakeholders, those measures efficient to provide sufficient GHG emission savings following GEF criteria, and that are compatible with local stakeholders’ priorities and interests. Generally, climate change mitigation is not at the top of priorities in many cities, and decision makers will rather expect from the project to deliver concrete actions to meet their day-to-day priorities: congestion, parking shortage, public transport financial deficits or to support their flagship projects: a modern LRT, a new bridge, a redeveloped pedestrian area... The project design stage has to find a compromise in which a sufficient GHG emissions reduction can be achieved while integrating some key aspects of the local policy

agenda. This introduces a first source of potential program bias towards climate change mitigation, compared with local priorities.

UNDP/GEF projects need to identify their key local partners. Depending on the country, these partners will be found at the central or the local government, or at both. These institutions usually have a strong hierarchical, top-down tradition, and a risk-avoiding culture, which makes it difficult to implement innovations. One additional barrier is the prevalence of outdated technical guidelines and specifications, which can be used as a justification to disrupt the implementation of innovative measures. Existing institutions are weak in many dimensions (including know-how, staff and resources), and difficult to undertake reforms and to cope with new responsibilities and procedures.

These circumstances favor the adoption of project contents that rely mainly on a shift strategy to meet the GHG emissions reduction target. An avoid approach would require a holistic action including land use regulations; an improve approach would require changes in vehicle and fuel regulations, involving the central government and a multiplicity of departments. Therefore, the core of the project usually refers to improvements on public transport and non-motorized modes, eventually coupled with some parking regulation to discourage car use, so that some modal change can be promoted.

The project has to find committed local partners in order to achieve actual implementation. This introduces an additional bias, as measures need to fall in the realm of competencies of heads of departments clearly convinced of the merits of the action to undertake.

The implementation of the project is conducted through local project management units, usually within the UNDP country office. Project managers are usually well experienced in this kind of projects and know well the local context. Their transport background is usually limited, but this is compensated by the mobilization of local and international experts. The project manager faces the challenging role of bridging the communication gap between these experts and the local civil servants and decision-makers responsible for actual implementation.

All these circumstances, linked to the GEF approach, introduce a program bias in the actions undertaken. GEF/UNDP projects will tend to focus on those modal shift strategies that are more aligned with the local short-term priorities and closer to the usual practices within the municipality, and they will succeed in implementing innovative measures only to the extent they find a particularly welcoming environment from local leaders and committed civil servants.

5.2. Strong focus on the strategic planning stage, with a strong road component

The strategic focus is stressed by UNDP and GEF guidelines. These recommend the preparation of some kind of planning document, ideally addressing both, land use and mobility issues. At the heart of this approach is the well-known principle that mobility is strongly influenced by land use and urbanization patterns, and that local decision-makers need a clear medium to long-term vision for their mobility systems.

Projects in the region benefit from relatively strong urban and transport planning traditions. However, these traditions have been weakened by more than two decades of *laissez faire*, and are poorly suited to operate under the current free-market conditions. Furthermore, the heritage of Soviet-style urban planning was not aligned with the principles of sustainable mobility. Residential areas had not many services in their vicinity, and were typically far from places of employment, concentrated in city centers, even in the case of industrial jobs. This meant long radial journeys, not suitable for NMT, and strong reliance on public transport. The dependence on motorized transport is not limited to employment but also apply to access to education, medical assistance and other basic services. These patterns are difficult to modify, and in fact the separation of land uses largely remains. The urban planning tradition remains static, focused on zoning and large infrastructure networks, and weak on regulation and policy. (World Bank, 2002).

The strategic urban transport planning process undertook in UNDP/GEF projects tries to move away from the traditional zoning & infrastructure practice and combine two approaches developed in Western Europe and other regions: on the one hand, the reliance on factual-based analysis through modelling; on the other hand, a dynamic, strategic planning process, based on a sustainable mobility vision shared by key stakeholders, clear objectives, and sound programming and budgeting of actions. This approach has been described in the EU guidance on Sustainable Urban Development Plans. In this approach, transport modelling plays a secondary, supportive role in the analysis of current mobility practice and in the review of the expected impacts of the plan actions. Transport modelling keeps

relying in the availability of quantitative mobility demand data, which is usually gathered through household mobility surveys (EPSUMP, 2014).

Most UNDP/GEF projects have included the collection of mobility data through a household survey and the development of a 4-stage transport model as one of the first actions to complete, and as a basis for the subsequent development of a strategic transport plan. Contrary to the western Europe practice of using models as a supporting tool, models in the region have been used in a way closer to the traditional 1960s style of scientific transport planning, and serve to assess and select the actions to be included in the plan. This has often resulted in a focus on the identification of traffic bottlenecks and the subsequent provision of additional road infrastructure capacity.

A good example of the above is the strategic plan prepared by the UNDP/GEF project in Almaty. The strategy followed the Sustainable Urban Mobility Plan (SUMP) approach common in the European Union (EPSUMP, 2014), and provided the municipality with a vision (involving many stakeholders) that was presented to the local public opinion. The strategy was able to integrate most if not all of the UNDP/GEF actions, and some additional projects pushed forward by other international agencies and financial institutions in the city, as actions within the first stage of the strategy. In spite of the dynamism of the project team, the preparation of the strategy took almost two years and significant resources.

In Dushanbe, the preparation of such a strategy derailed, due to the combination of barriers: insufficient resources, lack of basic local statistics (e.g. on population and dwellings), making it impossible to develop a sound transport demand model out of the mobility data collected, and lack of interest of the local government.

Local strategies became one of the main successful outputs of the Russian project. They were favored by previous planning efforts in Moscow and Saint Petersburg, and strong support from the federal government. The “Integrated traffic management schemes” (ITMS) in Kaliningrad and Kazan have a strong focus on car traffic, and major public transport infrastructure actions. They were subsequently prepared in two additional cities (Krasnoyarsk, Rostov-on-the-Don), and are now compulsory, in accordance with federal legislation in all medium-sized cities.

The preparation of a sustainable mobility plan for Batumi and its region was the main action in the UNDP/GEF project in Georgia, in terms of dedicated financial resources. The plan includes feasibility studies and detailed designs for some the measures to be implemented within the project, including a parking policy, an optimized public transport network and new bike trails. The achievement of a comprehensive plan was greatly appreciated by all local stakeholders.

Transferability of both, modelling and strategic planning, is an issue. In spite of considerable training efforts to transfer models and planning tools to local technical services or to local universities, the results show that these tools are not appropriated by their targeted final users.

Overall, the preparation of long-term transport plans as a part of the GEN/UNDP project activities should be considered as highly positive. It has served to establish a common understanding among key stakeholders around sustainable mobility, and to identify the key actions to undertake in the future. Furthermore, these plans have served to adopt more strategic, dynamic approaches to transport planning, compared to the traditional rigid patterns of the past. It has also made local professionals familiar with the wide array of modern planning tools usual within the global transport planning community, from transport modelling to co-creation workshops.

It is worth stating that this progress in transport planning has not been achieved without some shortcomings. Firstly, a certain over-reliance and centrality of transport modelling results: rather than being used as an instrument to verify the impacts of the new transport actions, models have often been used as the primary tool for decision-making. This has resulted in a strong attention to road projects within the plans (particularly in the case of Russia and to a lesser extent in the case of Almaty). Furthermore, planning activities have been hampered with limited availability of information, due to poor mobility statistics in cities regarding traffic flows, vehicle fleets and public transport patronage. In some cases, this has included full-size household mobility surveys, requiring extensive resources and time. Finally, the effective transfer of these planning tools (and particularly of transport models) to local experts or institutions has frequently been ineffective, due to staff shortages and to unclear tasking for the newly trained staff.

The centrality of strategic transport planning within UNDP/GEF projects in CIS cities can be considered as an indicator of the strong sectoral approach in these projects. Whereas the transport system in these cities has a strong social and economic impact, the planning process focuses exclusively on the quantitative and environmental aspects of mobility, without little, if any attention to vulnerable groups and low-income population. The boundary of the

project is too rigidly separating transport from other urban policies, with a sectoral bias that does not properly takes advantage of the synergies that transport actions could generate with social and economic objectives.

5.3. A critical component in all projects: public transport improvements

The improvement of public transport services is a common component in all the projects reviewed. Although all the projects describe a situation of declining public transport systems, with shrinking passenger flows and poor quality in terms of speed, reliability and comfort, there are, significant differences among countries. The public transport system is in particularly poor shape in the case of Dushanbe: old, worked-out buses and trolleybuses, lack of reserved infrastructure to avoid traffic congestion, non-respected schedules and significant revenue leakage. In the case of Batumi, the municipally-owned bus operator attempted to improve the service quality through the implementation of a dispatching center and the renewal of the fleet in 2005, bus increasing traffic congestion (and lack of reserved bus lanes), coupled with an inefficient bus network design resulted in further deterioration of service quality and passengers' loss.

In Almaty, the project reported some previous progress in public transport quality, with some restructuring of the lines, fleet renewal and a new fare collection system to avoid leakage.

In Russian medium-sized cities, the project stated that the situation was different among the two pilot cities: Kazan had already undertaken some major steps towards recovery (reserved lanes, modern fleet, replacement of informal services by low public transport quality mainly through the implementation of some infrastructure priority, a dispatching system, new vehicles and the replacement of informal minibuses by regular lines. Kaliningrad however, was clearly lagging behind in all these fronts.

In all cases, the UNDP/GEF projects served to identify actions for public transport improvement and to implement some measures, although with a different degree of achievements. Progress seems to be slower in those cities (Dushanbe, Batumi, Almaty, Kaliningrad) in which private minibuses (formal or informal) continue to provide service to a significant part of the population (see section below on this key issue). Furthermore, the implementation of dispatching systems has served in all cases to get a more accurate understanding of real operating conditions by managers and decision makers, and has resulted in some improvements in terms of speed, regularity and reliability. The implementation of bus lanes has met substantial barriers, that the projects have generally overcome only partially: from legal reforms to allow for segregation and enforcement of bus lane use, to awareness raising among car drivers and citizens at large on the necessity to respect bus lane use, and practicalities to actually dedicate the necessary resources to bus lane enforcement by traffic police frequently taken by many other priorities. Dushanbe and Almaty show successful examples on how bus lanes can be successful if they are associated to public space quality: as municipalities were keen in keeping a good image of the city in its main streets, having these streets (which happened to carry many public transport vehicles) equipped with well operating bus lanes was seen as a symbol of efficiency and modernity. The implementation of BRT and LRT corridors in Almaty is a good example of this effort.

5.4. The future of marshrutkas

As a transport option, marshrutkas appeared in Soviet cities in the 1930s. They were regular taxi vehicles that were assigned to fixed 'marching routes' (therein their name). In this way, the public transport system could be expanded to new, low-demand routes at low operational costs. With the economic decline and political turmoil of the 1990s, local administrations found themselves unable to fund their newly assigned responsibility public transport systems, which had not been followed by a corresponding transfer of funding (Gwilliam et al, 2000). The particular economic context and the entrepreneurial boom of the early 1990s favored the emergence of a multitude of operators providing the services citizens needed and the conventional public transport system could no longer provide. These operators included drivers joining lines with their own vehicles on a route sheet basis, salaried drivers employed by operators, as well as freelancers with their own or leased vehicles. It was largely a bottom-up movement of mobility entrepreneurs (some of them working at the same time in the municipal structures), in the lack of top-down action to solve the mobility crisis (Sgibniev, 2016).

The expansion of marshrutkas varied depending on the country and city context, the degree of deterioration of the public transport system and the capacity of regulators to keep some control on the activities of informal operators. At

a time of economic turmoil, low wages and raising unemployment, the transport sector became one of the few alternatives for income for many people. Akimov and Banister (2011) estimate that as much as one family in ten in Tashkent was supported by a member driving a taxi or minibus. Marshrutka mobility became a vital pillar of the economy of many cities in post-Soviet Central Asia. Sgibniev (2016, 276) suggests to speak of the marshrutka mobility phenomenon, which “would encompass vehicles, drivers, passengers and regulators, as well as an entire set of cultural practices connected to marshrutkas”.

UNDP/GEF projects have been implemented at the time marshrutkas were still active all the cities. Whereas the projects identified marshrutkas as a major challenge to the consolidation of public transport services of reasonable quality, they did not include specific actions on this topic. This resulted in major delays for the implementation of most of the actions on public transport, dealing with network optimization, integrated e-ticketing and improvement of quality standards. Lacking specific actions from the project to deal with the marshrutka sector, progress on public transport components depended on the particular regulatory actions municipalities decided to implement. In the last years, the general trend in CIS cities has been to regulate the marshrutka sector, with a view to progressively reabsorb them within the public transport system. Kazan is a good example of a successful and quick transition, which has replaced these services by conventional buses, and has integrated in the public transport system the former marshrutka operators and drivers. A similar approach is in progress in Kaliningrad. In other cities, such as Almaty, the transition is taking longer, as marshrutkas remain seen by the middle class as a way to distinguish themselves from ordinary public transport users. In Dushanbe, the municipality has been able to reduce the number of operators, to assign them to particular routes and schedules, and to require some minimum technical features for the vehicles; however, a large number of informal “freelance” drivers remain on the street, and there are no plans yet to replace marshrutka lines by conventional buses, even on the busier routes. In Dushanbe, as in Batumi, marshrutkas remain a significant source of jobs and income to many families, and there are no clear plans for a peaceful transition, which seems to depend on the previous improvement of the economic climate.

5.5. Clean vehicles: An undervalued option?

The renewal of the car fleet was seen as a relevant contributor to GHG emissions reduction in most projects, although with quite different approaches.

The replacement of public transport vehicles (and mainly buses) by more efficient and cleaner models was already attempted in the region in the previous years. However, there has probably been insufficient guidance on the renewal strategy. The starting point was an old fleet, with high energy consumption, so that the procurement of modern vehicles would result in energy and GHG emissions savings. However, it is worth noticing that a significant part of the old fleet included electric trams and trolleybuses, with excellent performance in terms of emissions compared to buses. Furthermore, the use of modern buses (diesel or CNG, which have been the usual choices) could reduce the emission of pollutants (PM and NO_x), but had not much effect in terms of GHG emissions, as fuel consumption and GHG emission have not been included in the standards for buses in most countries around the world yet. Therefore, the impact of public transport fleet renewal has been modest, at best. A similar reflection can be made referring to cars and other vehicles. In this case, some countries (like those in the EU) have promoted fuel efficiency through eco-labelling, informing the consumer about average fuel consumption and GHG emissions of new cars. The GHG reductions achieved through vehicle fleet renewal were modest, at best, and required tremendous efforts from the part of the project.

The situation has dramatically improved in the last years, as hybrid and electric buses have become available in the market, and hybrid and electric cars are commercialized by an expanding number of manufacturers. This potential was correctly identified in the Russian project, which included a component to support the deployment of “low emission vehicles” in Russian cities. A similar approach is followed in the transport component of the NAMA project in Azerbaijan, although in this case the deployment of low emission vehicles is limited to a modest pilot within the fleet of SOCAR, a major public company.

It can be argued that, as vehicle technologies are moving away from fossil fuels to electricity, that the GHG reduction potential of these measures is growing. In a context of still relatively low motorization rates and huge fleet renewal needs, the active promotion of electric vehicles in big fleets shows a tremendous potential. Furthermore, in a context of major technological changes, it would be important for these countries to move rapidly to these new

technologies, avoiding the risk of being flooded by import flows of obsolete second-hand diesel vehicles from developed countries transitioning towards electromobility.

There is also quite some technological uncertainty regarding the future of trams and trolleybus networks, still operating in these cities. These lines used to be the backbone of public transport systems in the Soviet times, but have suffered most from lack of infrastructure maintenance and lack of fleet renewal. The future of these lines is not clear, as discussed in most of the projects: in some cases, they are serving radial routes that have lost their past relevance due to changes in residential, industrial and commercial location patterns. Even if potentially attractive, it is not clear whether to upgrade them to expensive technologies (like the case of the LRT line in Almaty) or to rely on much cheaper regional solutions, with lower capital costs but probably higher maintenance and consumption costs, and lower quality features. There is also the option to replace them by bus services with reserved infrastructure, following the BRT paradigm successful in other regions. The review of projects in the region do not show a consistent approach, and it seems that some general guidance, based on the experience gathered in the past years, would be much needed.

5.6. Non-motorized transport: the bike debacle; and the low recognition of walking by local stakeholders.

All UNDP/GEF projects include a component to promote non-motorized transport (NMT). Walking and cycling are presented as an essential feature in sustainable mobility systems, and a relevant source for GHG emissions savings.

Mid-term and terminal evaluations of these projects show a tepid response to these efforts in terms of mobility behavior. Many circumstances contribute to explain the modest results achieved on this front. Primarily, it is necessary to highlight that urban patterns in many cities in CIS countries do not favor walking and cycling. Soviet urban planning imposed separation among residential areas (frequently established in high-rise building districts in the periphery, and employment and commercial areas (WB, 2002, p.10). Travel distances are long, and poorly suited to NMT.

The changes experienced in the land use patterns of these cities have created a more favorable environment, with the growth of the services sector in the central districts and new commercial space in both, the center and the periphery. However, these changes are slow, and have developed within weak planning frameworks, in which mobility has not been properly considered, particularly in what regards NMT.

The activities within UNDP/GEF projects have operated at two different levels: on the one hand, through capacity building and awareness raising activities addressed to transport professionals and civil servants, and to the public at large. On the other hand, by identifying pilot actions which could serve as demonstrators of the potential of pro-active measures to increase walking and cycling. These actions have been successful in bringing NMT to the mobility agenda in cities, even if their actual impact in terms of modal split has been modest, at best.

Pilot actions have shown the relevance of providing adequate guidelines for planning and designing networks for pedestrians and bikes. In the case of Dushanbe, the pilot cycling lane established during the first months of the project proved to be inadequate, creating additional safety hazards for pedestrians and residents, and poor cycling conditions for users. In the case of Almaty, the efforts for the Sustainable Transport Strategy was to create pedestrian zones in the city center, as well as to increase the number and conditions of crosswalks, and to develop a network of bike lanes and parking lots, and a bike-sharing service. These measures were only partially implemented within the project, but served to mobilize the Municipality to undertake a comprehensive study on walking (Towards a Livable and Loved Almaty) with the support of the consultant services of a renowned international firm (<https://gehlpeople.com/news/almaty-is-going-places/>).

Similarly, the projects in Kaliningrad and Kazan included considerations on NMT in their ITMS, which encouraged both municipalities to undertake more specific studies for the development of a cycling network and the recovery of some priority pedestrian routes.

In general, it can be concluded that these initial actions were necessary to initiate proper consideration of NMT in the targeted cities, even if results could not be reasonably expected within the project's timeframe. Progress in support of pedestrians are easier to achieve, and are linked to promising improvements in terms of road safety. Furthermore, these actions are usually combined with the improvement of the public space in central areas, which is a priority in many of these cities. The support and promotion of biking is generally slower, and requires adequate technical guidelines in order to be effective.

5.7. *Is there a role for traffic management and parking?*

This is a controversial area in all projects. Municipalities and many local stakeholders see the UNDP/GEF project as an opportunity to reduce traffic congestion and to improve car mobility in cities. However, most of the international experts mobilized in these projects consider that improvements in car mobility conditions will further encourage car use in cities, which still keep a relatively low share of car trips that should be preserved, as much as possible. At the time the projects were developed, all the cities were engaged in costly road investments to expand their primary road network in the city (new bridges, new orbitals, widening access highways...), mirroring the conflictual situation that transport planners find almost in any city around the world.

The projects' strategies usually moved in two directions: Firstly, supporting the implementation of traffic management systems which would increase road capacity without requiring additional physical space. This was developed through specific traffic studies (Kazan, Kaliningrad, Almaty), or through complementary projects, such as the safe city project in Dushanbe, which established new centralized systems to manage traffic lights and made some punctual reforms at key intersections. Secondly, through parking regulation, with measures that were more controversial and difficult to implement in most cities. For example, efforts to implement regulated paid parking in Dushanbe did not succeed beyond a modest pilot to prove the feasibility of establishing camera-controlled parking purveyance in one particularly busing public parking lot, as a first step to introduce paid parking subsequently. The implementation and expansion of on-street paid parking was smooth and quick in Kazan, and progressed at a more cautious path in Almaty, in this case through a PPP framework. As in many other cities, local decision-makers were extremely cautious regarding the implementation of restrictive policies to car use. The successful implementation of some modest pilot actions served to reassure them about the benefits of the approach and the limited opposition these measures faced, and encouraged them to expand these actions on parking regulation and some restrictions to car traffic on certain routes.

4. Conclusions

Supported by the Global Environmental Facility, UNDP has made a remarkable effort in the last ten years to promote sustainable mobility in CIS cities. In spite of their modest coverage in terms of cities targeted and of funding provided, these projects have provided some relevant changes in national legislation, and a bunch of practical experience for the region.

UNDP projects were launched at a critical moment: after the enormous difficulties and stress urban transport systems went through in the 1990s, and the relative stabilization of these systems in the 2000s. The picture of urban mobility in the late 2000s was a dim one: weakened public transport systems losing passengers and providing low-quality services, expanding motorization and car use, and dominance of marshrutkas, alternative jitney transport services provided with minibuses loosely regulated. This combination resulted in relatively high GHG emissions, compared to mobility demand, long travel times due to congestion and other problems such as road safety. Certainly, it was the right moment to help cities to transition towards sustainable mobility policies.

The evaluation of the projects provides a positive picture. Overall, the projects have helped cities to develop a long-term vision for their transport systems. A vision in which formal public transport recovers its traditional central role in these cities, the use of cars is timidly curbed through parking regulations and some traffic restrictions, and marshrutkas are progressively absorbed by the public transport system and replaced by more efficient, full-size buses. Furthermore, cities start to pay attention to non-motorized transport modes and integrate their promotion within local policies.

Action in public transport has typically combined service design and operations and the institutional framework. Cities have strengthened their public transport networks through infrastructure improvements (including reserved infrastructure for buses, trolleybuses and trams), redesign of their networks, computer-assisted dispatching systems or e-ticketing systems. They have also identified necessary reforms in their legal framework, in some cases establishing public transport authorities, or defining contract frameworks to integrate private operators within the system.

CIS cities seem to be looking for their own path towards sustainable mobility: on the one side by providing reasonable mobility options without incurring in the extremely high costs of Western Europe models with highly subsidized public transport systems; on the other side, by adopting restrictions on car traffic early enough to avoid the

construction of extensive and costly networks of high-capacity urban roads to accommodate a growing number of cars.

Significant barriers remain ahead in this transition towards sustainable mobility. On the one hand, the new interest for long-term planning in urban transport does not find a legal and political framework promoting broad participation, transparency and accountability in decision-making. Without such a framework, planning efforts risk to become too much dominated by technicians, and by the agendas of local politicians, and may fail to properly meet the priorities and preferences of vulnerable social groups. In fact, the experience is that in the absence of appropriate participatory mechanisms, decision-makers tend to pay more attention and priority to the facilitation of private car use than to sustainable mobility practices. Secondly, UNDP projects have not succeeded in addressing the social aspects of mobility in cities. Such social aspects include challenges such as working conditions in public transport, future options for current employees in marshrutka services, and public transport supply outside peak hours and to isolated neighborhoods (with a disproportionate impact on low-income and vulnerable populations). Thirdly, although NMT are now included in the urban mobility agenda, the path towards actual action remains unclear, lacking adequate technical guidelines and expertise. Fourthly, efforts to move towards more efficient fleets in public and private transport have lacked adequate discussion on the best clean technology options for CIS countries; such discussion is not a simple one: it should include questions such as energy availability, industrial strategies, and social needs. Based on these considerations, countries around the world are designing their transition strategies towards clean transport, and there is a need for CIS countries to explore the challenges and to design their particular transition path.

These barriers could be better addressed if GEF projects in the future overcome their current bias. Firstly, if the overcome their current program bias by giving more attention to social objectives together with the current focus on climate change mitigation. Secondly, by reducing their sectoral bias, fostering cooperation and synergies with social and economic policies in the city, and with the design of public space. Thirdly, by correcting their technological bias with greater attention to regulatory and governance reforms in the local transport bureaucracies.

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