TITLE:
"Corridor" designs in town planning:
Sustainable planning for large cities in developed countries

Challenges of implementation
in emerging and developing countries

L’urbanisme de « corridor »:
Une planification durable des grandes villes
des pays développés,
Quelles difficultés de mise en œuvre dans les métropoles des
pays émergents ou en développement?

Lyon Town Planning Agency, Lyon – France

Patrice Berger, Planner, International Activities Manager
p.berger@urbalyon.org
0(033)4 78 63 43 70 / mobile: 0(033)6 23 26 11 27

With the support of:

Nicolas Pech Planner-Engineer, in charge of Transport Studies
n.pech@urbalyon.org

Thibaut Descroux Engineer, in charge of Transport Studies
t.descroux@urbalyon.org

Marie Le Gac Former planner of Lyon Town Planning Agency

Claire Boisset Geographer, in charge of International studies
c.boisset@urbalyon.org
ABSTRACT

"Corridor" designs in town planning:
Sustainable planning for large cities in developed countries
Challenges of implementation
in emerging and developing countries

For economic and environmental reasons, cities in both developed and developing countries are seeking to organise, or reorganise, their urban development along major routes of mass transit (with surface, underground or elevated systems), constituting "corridors" for mobility and urban densification.

Large developed cities are better equipped, and have the necessary infrastructures (roads and railways) and financial resources to implement corridor-type urbanisation.

In more difficult settings (high growth in car ownership rates, omnipresence of owner-operator transportation, scarcity of road and rail infrastructures, lack of available land, little access to financing, etc.), many big cities in emerging and developing countries are hoping to develop mass transit on strategic routes.

To successfully implement corridor-type town planning in these booming yet under-equipped cities, a host of conditions must be met in the short, medium and long term:

- Limitations on the usage of private cars.
- Development and proper organisation of a complete network of public transportation (public buses and/or owner-operator vehicles) which covers more than just a few high-capacity corridors.
- Coordination of urban planning with transport planning in order to define the alignment of corridors and to reserve the land needed for the development of public transportation.
- Adequate financing from local, national and international sources.

These rather daunting conditions require strong political commitment, coupled with the necessary technical and financial resources.

In the very short term, priority must be given to offering inhabitants a reliable public transportation system (which will facilitate the shift away from private cars), and then gradually develop high-capacity transit routes along the major corridors of the city, using the transport modes most suited to the financial capacity of the local authorities and of the local population.
RESUME

L’urbanisme de « corridor » :
Une planification durable des grandes villes de pays développés,
Quelles difficultés de mise en œuvre dans les métropoles des pays émergents ou en développement ?

Pour des raisons économiques et environnementales connues, les grandes villes des pays développés, comme celles des pays en développement, cherchent à organiser ou réorganiser leur développement le long de lignes fortes de transport de masse (en surface, souterraines ou aériennes), qui constituent des « corridors » de déplacements et de densification urbaine.

Les grandes villes des pays développés, plus équipées, disposent de nombreuses infrastructures (routières et ferroviaires) et de capacités financières pour développer cet « urbanisme de corridor ».

Dans un contexte plus difficile (explosion en cours de la motorisation individuelle, omniprésence du transport artisanal, pénurie d’infrastructures routières et ferroviaires, manque d’emprises foncières, faibles capacités financières…) de nombreuses grandes villes des pays émergents ou en développement cherchent à développer des lignes fortes de transport de masse.

La mise en œuvre d’un urbanisme de corridor dans ces métropoles en pleine croissance et sous-équipées est soumise à de nombreuses conditions à remplir progressivement à court, moyen et long terme :
• La limitation de l’usage du transport individuel.
• Le développement et la bonne organisation d’un réseau complet de transport collectifs, (bus publics et/ou transports artisanaux) qui ne se limite pas à quelques corridors très performants.
• L’articulation entre la planification urbaine et la planification des transports pour bien identifier la charpente des corridors et réserver les emprises foncières pour y développer du transport en commun.
• La recherche de financements municipaux, nationaux, internationaux.

Ces conditions, difficile à remplir, supposent une volonté politique très forte associée à des moyens techniques et financiers.

À très court terme, la priorité consiste à proposer aux usagers un réseau de transport collectif très fiable (qui facilite le report modal du transport individuel aux transports collectifs) puis progressivement à développer des lignes fortes sur les corridors majeurs de la ville, avec des modes adaptés aux moyens financiers de la collectivité et des usagers.
CONTENTS

Context
Housing shifted to peri-urban areas, business activities to the suburbs and uncontrolled sprawl of the urban footprint: these phenomena, coupled with the high levels of car ownership in developed countries and rising levels in emerging countries, despite the increase in energy costs, have given rise to patterns of urban structure which are unsuited to collective mobility in large metropolitan areas. The consequences are numerous, in economic terms (difficulty in satisfying public transportation needs with limited financial resources, rising share of household income spent on transportation), in social terms (deterioration of the quality of life, social and geographic segregation of those living on the periphery, cut off from the services and amenities of the centre) and in environmental terms (consumption of space and energy, air pollution).
Real efforts have been made to resolve the problem of intra and inter urban transportation and new technologies contribute to progress in this area, but the search for a sustainable solution will necessarily involve concrete actions to determine the shape of towns and the coordination of geographic planning measures with those of transportation policy.

One form of coordination between town planning and transportation is the corridor.

Corridor designs in town planning

Most large cities in developed countries began their spread in a "tentacle" pattern along the main roads leading to the city centre, and then continue to sprawl thanks in particular to high rates of car ownership.

Growth of traffic due to individual mobility results in urban congestion and a decline in the use of public transportation.

The “corridor design” consists of rethinking the composition of a city around main lines of public transportation. Using the same amount of land, it enables the transport of larger numbers of people than is possible with private vehicles, while reducing the social and environmental impact of mobility (cost of transport, flow consolidation, extension of electrically powered systems, etc.). The goal is to produce a more sustainable pattern of urbanisation so that residents have access to the services and amenities they need without recourse to a private motor vehicle.

Illustrative drawings from reality towards corridors design

1. The reality without planning

2. The target: the town planning of corridors

3. The expected reality based on the planning of corridors

Source: David Mangin – « La ville franchisée »
The public transportation systems serving these corridors can take several forms, with various implications, notably in terms of capacity, investments and operating costs:

- **Surface systems** (tramway, Bus Rapid Transit, …): these are the least costly systems, which can prove very effective and have the added benefit of visibly demonstrating to people the existence of an alternative to private cars. Problems of capacity and urban barriers may arise however with the increase in coverage, and so a shift towards underground or elevated sections of the system may become necessary in the most heavily occupied areas.

- **Elevated systems** (overhead metro, Light Rail Transit, …): an intermediate solution between surface and underground systems in terms of cost, this type of transportation can provide a level of capacity comparable to that of underground metros. Like the latter, it does not interfere with surface traffic but can cause disturbance if located too close to buildings.

- **Underground systems** (metro, express metro lines): much more expensive in terms of investment and operation. The underground system offers the advantage of high-volume transport on a main line while generating virtually no impact on the urban environment. The issue of how much space to allow for cars at street level gives rise to a variety of responses in each case. The areas benefiting from underground systems can just as well be transformed into pedestrian zones, rather than road traffic, depending on local priorities.

### 1. Corridor designs in France and other developed countries

In France, notions of sustainable development and coherence between urban development and public transportation have only recently been translated into legislation (law on solidarity and urban renewal, December 2000).

One example can be found in the Lyon urban region (**1.7 million inhabitants**) where the core area is equipped by bus, metro and tramway: Like most other French cities, it had developed around the widespread use of the automobile, in the tentacle pattern described above, followed by a generalised sprawl of the urban space.

**The Lyon metropolitan area is nonetheless lucky in that its main roads and motorways, which were an integral part of its development, ran alongside a pre-existing railway system.** The key urban centres are thus served by railways and the improvements in coverage via these lines, particularly to peri-urban areas, contribute to the credibility of urban development in proximity to the rail stations.
The local authorities, intent on pursuing policies to promote this trend, called upon the Lyon Town Planning Agency to conduct a study in 2005, with the aim of measuring the effective capacity for urban development around the Lyon railway hub and spoke system. The first results of the study showed that zones near rail stations have genuine potential for densification, capable of receiving between 110,000 and 250,000 new inhabitants (i.e. over a third of the additional population expected in the Lyon area by 2030).

Beyond these strategic zones near rail stations, if we consider all of Greater Lyon's zones with high-capacity public transportation lines already in place or planned for the near future, we arrive at a definition of a territory capable of channelling its future urban development.

The question remains nonetheless of the modalities for developing public transportation as an alternative to private cars for those peri urban areas, already urbanised, but which are not located near the railways: ways to improve the coordination of service and organise feeder transport to stations are currently being explored. Additional types of solutions will no doubt be needed in the future in these areas.

The issue of coordinating town planning and transportation has been closely studied for years at the European level: travel practices and policies, as well as modes of urban development, vary greatly from one country to another, though they generally follow the trends described in the introduction. In many countries of northern Europe in particular (Switzerland, Germany, Sweden,
In Denmark..., the local and national authorities have sought to limit the natural tendency towards dispersion of housing by channelling the development around fully constituted and equipped urban centres and by ensuring the continuation and/or expansion of rail transportation. For example, Stockholm and Copenhagen have merged their land use and mobility plans, which has enabled them to build new districts according to a "string of pearls" pattern, developed at the same time as new metro stations are built. In Switzerland, urbanisation is highly clustered around stations, with massive use of express rail lines connecting to other public transportation modes: the topography of the country and its urbanisation in the valleys have contributed to a nationwide urban organisation compatible with coverage by the railway system.

At the European level, the aim of the PLUME project (PLanning and Urban Mobility in Europe) was to gather and disseminate interesting research and experiences addressing issues of land use and mobility planning in order to improve the quality of urban life in Europe. The project concluded in 2005 with a report identifying the stakes and challenges, as well as the policies and processes capable of responding to these needs. In the same way, the Franco-German Bahn.Ville project, launched in 2001, aimed to analyse and compare the development of "rail-oriented" town planning in the urban areas of both countries: the process confirmed the fact that Germany, a more densely populated country, is more advanced than France in this field. The first phase of the project was extended with an action-research process (Bahn.Ville 2), now being tested in Saint-Etienne, not far from Lyon, with the goal of putting into action the main operational principles of corridor-style town planning.

In North America, proponents of the New Urbanism also support the "Transit Oriented Development" (TOD) model and encourage the densification of suburban areas, dominated by detached houses, around railway stations.

In South America, many large cities are developing BRT (Bus Rapid Transit) systems. In Curitiba, a Brazilian city famed for its bus rapid transit, the authorities understood very early on the need for an integrated and holistic approach to the metropolitan area. Starting from a linear model of a very dense urban development, the Curitiba authorities began to channel urban expansion along five major arteries (called "corridors"), with a total length of 80 kilometres combining public transportation on the central arteries with other modes on parallel axes. This BRT system is the backbone of a complete bus network composed of 350 km of feeder bus lines and 200 km of interdistricts bus routes. The system is currently saturated, however, and will require the construction of new passing lanes for buses, in front of the stations, in order to improve capacity.
II. To what extent can corridor urbanisation be implemented in big cities in emerging and developing countries, which often lack infrastructure and are experiencing an urban boom?

Major urban areas in emerging and developing countries are seeing growth rates which most cities of developed countries never experienced; they must handle in 30 years a population increase which cities of the industrialised world took 100 years to reach.

Compared with their counterparts in developed countries, many developing cities have a severe lack of urban transport infrastructures, which undermines the implementation of corridor-type town planning.

- Absence of railways or a railway hub and spoke system to handle regional inter-city service or peri-urban commuter traffic.
- Absence (or only partial presence) of motorways at the city edge and ring-roads capable of diverting heavy freight traffic or commuters in private automobiles.
- Weak density of the roadway system, characterised by a small number of urban boulevards often plagued by uncontrolled parking, and a network of secondary roads in very poor condition (unpaved or severely deteriorated).
- Highly active owner-operator transport market (very useful) and weak forms of public mass transportation.
- Social and financial difficulties in obtaining the land to widen urban boulevards or existing roads, or to build new roads.

Setting aside and clearing land is no doubt the single most critical issue in resolving the problem of traffic congestion in the big cities of developing countries, where most local authorities cannot come up with the financing necessary to develop underground metros or elevated LRT mass transit systems.

- Lack of local, national and international funding to pay for the acquisition of land and the development of medium and heavy infrastructures for mass transit.

In parallel, due to the rising incomes of the middle classes, vehicle ownership rates (cars and two-wheel motorised vehicles) are booming. Along with growth in owner-operator transport, this will generate greater congestion if car owners do not change their behaviour and opt for public transportation for their commuting needs.

The proper functioning of emerging and developing countries big cities, as in developed cities, requires a corridor pattern of urban development in order to solve the problem of traffic congestion and meet the need for mobility, while addressing environmental concerns.

There is thus a real need to organise urban corridors with public mass transportation in dedicated lanes, using surface, elevated and underground systems, depending on the financial capacity and land constraints of the town.

Be it in Ho Chi Minh City or Rabat or Addis Ababa, authorities are now working to develop dedicated lanes for public transportation (bus or tramway), and, as it the case in Hồ Chí Minh-City, other “heavier” mass transportation systems.

Given the situation of rising car ownership and scarcity of road and rail infrastructures (and the land to build them on), the launch of a new mode of surface public transportation in dedicated lanes would enhance the attractiveness of the urban area it serves, bringing in new functions, housing and office developments and, above all, commercial activity (street markets, informal economic activities, shops, etc.).
Naturally, the new mode of public transportation in dedicated lanes reduces individual traffic on this artery but the attraction of the zone can engender new forms of traffic on top of the previously existing forms: out-bound traffic, freight, commuters in cars or on motorcycles, owner operator transport traffic, local traffic, feeder traffic to public transport hubs – and all of this on a narrow site, further reduced by the dedicated transportation lanes.

Under these conditions, how can we ensure that these corridors – meant to help develop surface public transportation and greater urban densification – do not become a source of congestion, with the negative consequences in terms of economy, pollution, difficulties for pedestrians...

**Can the positive effects of corridors (accessibility and greater mobility for all, strong incentive for urban renewal, restructuring of urban sprawl, etc.) be preserved if we anticipate the adverse effects which can "kill" a corridor (congestion, pollution, flight of useful commercial activities, drain on secondary urban centres, …)?**

In poorly equipped cities of developing countries, the lack of infrastructures cannot be remedied overnight, in particular as concerns the problem of obtaining land and financing. The development of corridors can improve the efficiency of urban public transportation and urban quality along the corridors only under certain conditions, presented below:

**A) Make real efforts to limit the use of private cars**

The authorities must find a way to offer inhabitants a credible alternative in the form of public transportation and encourage them to limit the use of their cars or motorcycles. Given the rapid rise in mobility (strong demographic growth in cities of developing countries, economic growth, higher incomes of the middle class), convincing people to use public transportation requires strong incentives, in particular.

An attractive public transportation system offering complete coverage of the city, with:
- comfortable vehicles and a modern image
- sufficient frequency and regularity
- priority at connexion traffic lights
- strong limitation of car parking along corridors
- attractive fare pricing
- easy connections
- well-organised intermodalism at public transportation hubs between owner-operator vehicles, individual park & ride facilities (for cars and motorcycles), etc.
- quality and comfort of open public spaces for pedestrians

The rising cost of fuel, urban congestion, traffic constraints and taxes on imported vehicles can also help slow the growing rates of car ownership, or at least limit the usage of cars which, more so than in the West, are considered a sign of social advancement.

In Ho Chi Minh City and Rabat, car ownership is booming and will lead to a steady worsening of congestion if no credible and efficient public transportation system is put in place to encourage people to leave their cars at home.
B) Offer a complete public transportation system with adequate coverage

Authorities will not be convincing if they create an efficient service on only one major artery and offer only mediocre service on the rest of the system. The creation of a single corridor does not properly address the issue, neither in terms of modal shift, nor in terms of a better balance of attractiveness throughout the city. We must debunk the myth of the metro line that will solve all problems.

During the lengthy process of constituting a complete public transportation network (heavy or medium infrastructures), it is best to offer a homogenous bus service throughout the city, well coordinated with owner operator transport market, with dedicated lanes (e.g. BRT) in corridors, rather than, with the same budget, offer excellent tramway or metro service on one corridor and no credible and complementary bus service elsewhere.

In Rabat–Salé - Morocco (urban area of nearly 2 million people), two tramway lines are under construction and will open the way for a corridor-style town development.

How will a complete bus service, complementary to owner-operator service, round out the service of the tramway lines?

How can the authorities best choose the sites for future corridors (tramway or BRT) so that they will serve all the existing and future strategic development zones of Rabat, including new towns?

---

**Rabat-Salé – Morocco**

How to locate major development sites along the future mass transport corridors?
In Ho Chi Minh City (6 million people in 2006), the economic capital of Vietnam, (emerging country), the revision of the master plan proposes the development of mass transport corridors (Urban Mass rapid Transit) using underground metros in the central zone and elevated systems in peripheral areas. What kind of quality will the general system (buses) have while waiting for the construction of the very costly new system? How can heavy traffic and freight be removed from the corridors in order to improve the urban quality along the corridors?

A network of corridors constitutes of course one good means of convincing the population to use public transportation and of achieving a better balance of the most attractive urban activities. But can cities in emerging and developing countries create the needed number of corridors (and how quickly?) in the short term, though they barely have control over the land, nor the financing to buy the land, infrastructures and rolling stock for public transportation?

C) Coordinate urban development planning and mobility planning with the aim of reserving land for public transportation in dedicated lanes

Large cities in developed nations benefit from numerous pre-existing infrastructures (railways of the 19th and 20th centuries), metros, motorways leading from and around cities, wide boulevards, etc. which now make it easier for them to integrate high-capacity public transportation along these densification corridors, coupled with their greater financial resources.
This is not the case in most cities of emerging and developing countries.

Of course, some of the more historic cities have preserved and developed old infrastructures (tramways, in particular) but most of them are mushroom towns whose growth was not truly taken into account in urban planning which should have set aside land for public transportation.

The coordination of urban development planning and mobility planning (transport master plan, urban mobility plan) is a recent objective of State and local authorities, notably promoted by funding organisations which pre-finance certain infrastructures for urban transportation, especially mass transit.

This coordination requires:

- to identify a structure plan for the development of the city, specifically its main corridors linking the core city area to all the major sub centres and strategic sites for development (business, main facilities...);
- to anticipate the implementation of those corridors, notably by land reservation;
- to promote investment and densification through a dense urban development (high density buildings rights) along these corridors.

In Addis Ababa, a developing country metropolis (more than 6 million inhabitants within 10 years), the revision of the master plan (2002) and the transport master plan (2005) were purposely coordinated. The plans provide for the construction of mass transit lines along two major arteries of the city, on an east-west and north-south axis. This framework for public transportation will serve all the city's main facilities, both present and future, likely to generate traffic.

Will the city be able to develop a more costly LRT on both axes, improve its efficient existing public bus service all over the urban area and acquire the land for further development?

Would a BRT, properly integrated in the urban fabric, be more appropriate in terms of investment and operating costs as a first phase before developing the LRT system?

Addis Ababa-Ethiopia Revised Master Plan (2002) Two major urban corridors (east-west/north-south): two development axis (blue) linking strategic development sites (red) and serving future extension areas (yellow)

Source: Lyon Town Planning Agency

Anticipation and reservation of land is an absolute necessity for future public transportation in expansion zones of cities in emerging and developing countries. Anticipation of needs is the least expensive solution for the local authorities.
While this is often still possible in peripheral zones, it is no longer possible in central areas where densification, low social acceptance of expropriation and relocation, and the growing cost of land make it difficult to enlarge routes for public transportation.

The question then is the following: how can these cities plan well in advance for corridors, though the infrastructures will only be built gradually, as the city grows and financing becomes available.

In other words, how can authorities and planners design the city before equipping it, or how can they physically draw up the main arteries of the urban area before building the infrastructures for high-capacity public transportation.

Some cities, such as Bamako-Mali (1.7 million inhabitants), in addition to their growing numbers of cars and motorcycles, not only have a well-developed owner-operator transport market which could benefit from better organisation, but also land which is readily available for developing corridors.

On the left bank of the Niger, how can the existing underused rail track be used to more efficiently handle urban and peri-urban commuter traffic?

D) Find the necessary funding

The slow pace and gradual construction of transport infrastructures in many cities in the emerging and developing world must be accelerated to catch up with the speed of their demographic and geographic growth. Without any strong decision-making powers, it can take a decade to implement a public transit service in dedicated lanes.

We often underestimate the time needed for the preparation and construction of these infrastructures: hesitations over the choice of transport modes, underestimation of the cost of construction and particularly operation, difficulty in finding financing, etc. Authorities are thus often tempted to seek quick, and sometimes “hazardous”, financing solutions (notably for both investment and operating) by way of public-private partnerships (concession) without a full understanding of the constraints (subsidies, risk of loss of control of the network development, …) and the need for public control which such partnerships requires.

The financial engineering which would allow local authorities to exert sufficient public control over the management of their public transportation systems is a crucial issue, rendered largely impossible so long as these developing cities have difficulties in obtaining loans.
Conclusion

To promote corridor designs in the town planning of big cities in emerging and developing countries, authorities and funding organisations must take action in two key areas:

- Coordinate urban development planning and public transportation planning in order to set aside as early as possible the land needed for infrastructures in the medium and long term. Obtaining land is crucial but such a costly policy, whose benefits will only be felt in the medium term, is not necessarily a priority for local authorities, continually forced to deal with pressing urgent issues.

- Obtain financing for these costly infrastructures (BRT, surface tramway) or very costly systems (metros, LRT, regional trains), both from funding organisations and private partners, until loans (national or international) become more readily available and local taxes can reach the same levels, proportionate to income, as in developed cities.

Urban corridors must become a priority objective for sustainable development in those big cities faced with the rising cost of energy.

This objective is credible in the medium term provided that authorities show pragmatism and budgetary realism and do not opt systematically for quick-fix and, in some cases, hazardous solutions and that they pursue actions for the medium and long term: effective measures to limit the use of private cars, anticipation for land acquisition, search for realistic funding solutions.

What to do in the short term:
The first step, when it is possible, is to develop and organise a complete and reliable public transportation system (bus and/or organisation of existing owner-operator market), then to gradually improve the system by implementing dedicated transit lanes in major corridors, with BRT or heavier modes if the local authorities have the means to cover the investment and operating costs without jeopardizing the quality of the rest of the system.
REFERENCES OF THE AUTHORS

Activities in Lyon:
- Revision of the Lyon Master Plan - Lyon 2010 (1,3 M inhab), 1990
  Revision of the Lyon Master Plan, 2008
  Coordination between 11 Master Plans of the Lyon Urban Region (2,6 M inhab), 2007
- Channelling and express metro, 2007
  Capacity for urban development next to stations in the Lyon hub-and-spoke railway system, 2006-2008
  « Urban development next to railway stations », February 2008

International activities in 14 big cities in the world:

San José – Costa Rica; San Salvador – Salvador; Jaipur – India; Hô Chi Minh-City – Vietnam; Aleppo – Syria;
Tripoli – Lebanon; Rabat – Morocco; Algiers – Algeria; Addis Ababa – Ethiopia; Porto-Novo – Bénin; Bamako – Mali; Ouagadougou – Burkina-Faso; Riga – Latvia.

In the field of Transport issues:
- Master plan of Addis Ababa - Ethiopia (Ethio-french bilateral cooperation)
- Assistance to the Project owner for revision of the master plan of Hô Chi Minh-City - Vietnam (city-to-city cooperation)
- Cooperation-partnership with the urban Agency of Rabat-Salé – Morocco
- Assistance to the Project owner of the Transport Master plan of Rabat-Salé-Morocco (city-to-city cooperation)
- Assistance to the planning process of Bamako-Mali (city-to-city cooperation)