Building a Public Transportation System in Hanoi: Between emergency and constraints

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Abstract: Today, the urban landscape of Hanoi is marked by a massive increase of private vehicles. Cars and motorcycles are filling the streets and make the traffic conditions difficult. In order to reduce congestion, the Vietnamese government plans a Public Transportation System (PTS), which is composed of metro lines and dedicated bus lanes. Meanwhile, congestion and pollution issues are becoming increasingly important. Moreover, the public transport network, which is under preparation and implementation, is slow in realisation.

Our research focuses on the discourse that is held by the authorities and the solutions proposed in a short- and long-term in order to cope with these issues. While the concept of sustainable development and sustainable transportation is presented as a goal in local policies, we examine the public transport projects through the prism of integration. Given the urgency to act, the concept of integration is here put as a constraint but also as a *sine qua non* condition for the construction and the management of a transport system to facilitate mobility for all, as well as for reducing the emission of polluting gases.

This paper concludes that technology, i.e. modern means of transport, will be useful if the integration of public transport system into the urban planning is guaranteed.

Keywords: Hanoi; Transportation; Urban Planning; Sustainable Development.

Introduction

The urban landscape of Hanoi is today marked by a massive increase of private vehicles. Motorcycles and cars are filling streets and make the traffic conditions difficult or even chaotic. In the middle of the 1990' scholars described Hanoi as a city where transportation is shifting from bicycles to motorcycles (Godard, 1996). In the middle 2000, researchers assess Hanoi is a "motorcycle dependant city" (Khuat Viet Hung, 2006) and traffic congestion issues are becoming more and more an issue. The Vietnamese Capital which is recognized as a "fast growing city" faces its first large congestion problems like other Asian cities, especially those that have been experiencing rapid motorization (Barter, 2000). In this regard, many counter measures have been applied by local authorities such as: expanding the existing road network; building new roads, flyovers and underpasses; road intersection reorganization; enforcing traffic laws; applying traffic signals; improving the operation of the current public transport system. But despite all these investments, the situation has not improved significantly.

As it is expected that the next step of urban mobility in Hanoi would be the shift to the car, the authorities took some years ago some political decisions to slow down this radical transformation. Indeed, based on the decision No. 90 signed by the Prime Minister in 2008, the Vietnamese government and the local authorities plan to implement a comprehensive Public Transportation System composed of metro lines and dedicated bus lanes in Hanoi. This plan is orientated at a sustainable urban transport concept aiming the improvement of the traffic condition and the reduction of the air pollution. Meanwhile, congestion and pollution problems are seriously increasing in the city.

Whereas there is an emergency to solve congestion problems in Hanoi, this research is focused on the discourses that official Vietnamese organizations and authorities held on sustainable urban transport and the tools (meanings and policies) that institutions want to implement in order to cure this situation. The construction of a Public Transport System (based on a *Mass Rapid Transit* / *Light Rapid Transit* network and *Bus Rapid Transit* lines) seems to be a relevant answer in order to reach the goal of a sustainable urban transport system. But doubts appear because of the slowness of its implementation and the difficulties the city has to deal with to accomplish the construction of an integrated Public Transport System.

In order to give a clear picture of the situation in Hanoi, first an updated diagnostic of the traffic situation in the capital city will be discussed in this paper. Many scholars and studies have stressed the increase of private vehicles but none dig into the meaning of this rise in terms of road space occupancy or fuel consumption. In the next part, we expose how different stakeholders who have to contribute to improve the traffic situation and to participate in the planning and the implementation of the Public Transport System understand a sustainable urban transport concept. Our finding will be that the term of a sustainable development is used by a wide range of stakeholders but with their own interpretation. In the last part, after introducing the skeleton of the comprehensive Public Transportation System, we examine this ongoing project through the prism of integration. Given the urgency to act, the concept of integration is here set as a constraint but also as a *sine qua non* condition for the construction and the management of a transport system to facilitate mobility for all, as well as for reducing the emission of polluting gases.

1/ Another sight on the traffic congestion in Hanoi

In its last contribution on new paradigm for sustainable urban transport, ADB experts indicate "most Asian cities have grown more congested, more sprawling, and less liveable in recent years; and statistics suggest that this trend will continue" (ADB, 2009). This affirmation can be also verified in Hanoi. Since few years, there are several studies on transportation and urban traffic[1], which have been conducted. They stressed the increasing of the individual motorized means of transport and warned about the difficulties to manage such traffic. Moreover, due to rapid urbanization and a fast economic development, the current situation on urban transportation had changed since the conclusion of those studies; the situation has got even worse.

[1] Such as the "Vietnam Urban Transport Assistance Project" (SIDA 1994), the "Master Plan of Urban Transport for Hanoi City" (JICA 1997)", the "pre feasibility study of the Hanoi Urban Transport Development Project" (ITST consultant, 2006) and the "HAIDEP Project" (Almec, 2007)

1.1/ Current traffic trends:

Previously, Hanoi was a city where motorized vehicles were rare. Until the late 1980's, the majority of displacement was made by bicycle[2] or public transport. Since 1986 with the economic reforms of *Đổi Mới* and thanks to an impressive economic growth (between 7% and 8% per year since the early 2000s), many urban citizens were able to afford and use motorcycles and cars (*Figure 1*)[3]. In 2004, there were nearly 400 motorcycles per 1000 inhabitants and 12 cars per 1000 inhabitants, though these data are now exceeded by far. In 2009, Hanoi had nearly 3.7 million motorcycles and 302 000 registered cars (Tramoc, 2010) while its administrative territory had expanded in 2008[4]. Let us retain only that in 2008 (before Hanoi's expansion), motorcycles were used for more than 80% of urban trips, 11% in public transport and 4% by car. In 1995, bicycle accounted for 47% of travel and only 3% in 2008. The examination of the modal split (*Figure 1*) obviously indicates the growing number of motorcycles, while showing only a weak increase of the number of cars. This is misleading at first glance as it does not point out the problem posed by the inclusion of cars in the city. Although the number of motorcycles is important, the impact of the cars' polluting engines and the amount of space taken up on the road is significant. Thus, it is the increasing number of motorcycles combined with the arrival of cars that leads to the two most undesirable, yet well known, consequences: congestion and pollution.

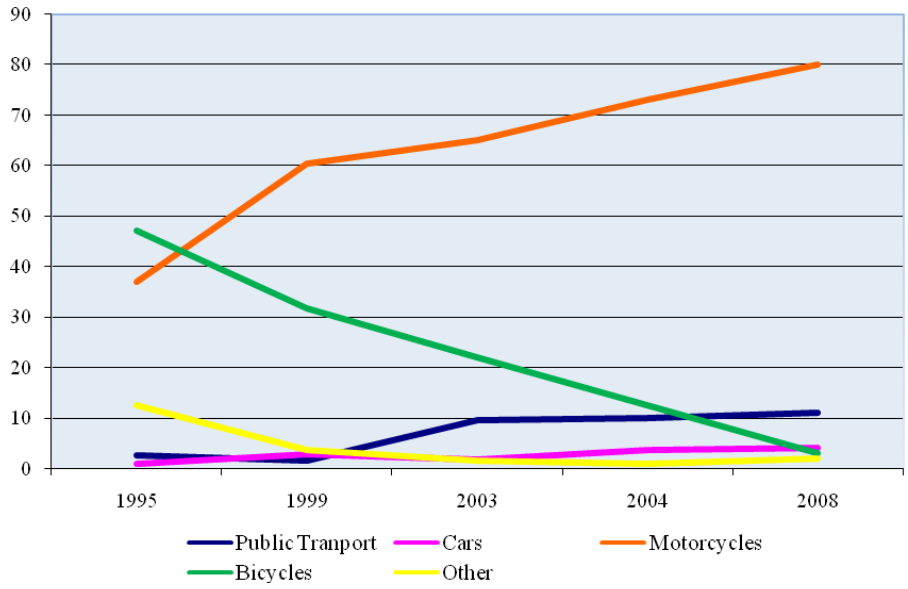


Figure 1: Tendency of modal split in Hanoi (1995-2008) (in % of displacement by means of transport), Graph by C.Musil

To give a clearer picture of the situation regarding traffic congestion, we have carried out further surveys on the methodological basis experienced by TRAMOC[5]. This department had made in 2002,

[2] The bicycle use was widespread in the late 1970's and during the 1980's thanks to rising living standards and due to the consolidation of a domestic bicycle industry (Cusset, 2004).

[3] Concerning model split by means of transport, it's difficult to get accurate data in Hanoi. Those are taken from different scholar and studies: Cusset, 2000 (for the modal split tendency in 1995 and 1999); TUPWS (previous name for the Department of Transport of Hanoi, DOT), 2003 (for modal split in 2003); HUTDP BRT feasibility study / WB Project Document, 2004 (for the modal split in 2004); Tramoc, 2008 (for the modal split in 2008, comes from the survey implemented at the end of year 2007). All those data were not done and obtained based on a unique method. That's why we insist here to present only a tendency as road conditions on the traffic count points and methodologies are different. That's why also from an institution to another there are problems to understand perfectly what the reality of the traffic situation in Hanoi is.

[4] Since August 2008, Hanoi has got an area of 3,349 km² (previously 921 km²) and its population is 6.5 million inhabitants (while it was about 3.5 million before).

[5] It is the Hanoi Public Transport Management and Operation Centre, under the Department of Transport (DOT), which belongs to the Hanoi People's Committee (HPC).

2003, 2006 and 2008 traffic counting surveys at various strategic points of the city. To give an accurate picture of the situation and passed the difficulties associated with the establishment data, we opted to make a statement on *Kim Mã* (*Figure 2*). It makes more sense to show on one significant point how the situation has changed. We used the same method as used by TRAMOC in 2002 for the traffic survey 2010.

From this survey and comparison, we can affirm Hanoi is still a motorcycle depended city. The increasing of private vehicles ownership can be observed still by an explosion of motorcycle on the roads, while there is a significant increase of cars. The roads of Hanoi are close to the limits of capacity. The very heavy traffic is only possible because of the high percentage of motorcycles. The greatest danger is the further increase of private cars, which use a lot of road space.

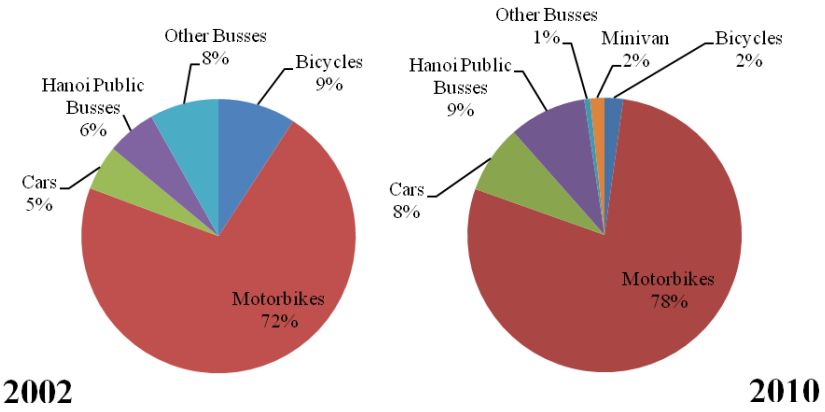


Figure 2: Kim Mã Street - Comparison of the modal split (in % of displacement by means of transport) between 2002 and 2010 (Source: Tramoc 2002, Molt C. 2010).

Briefly, according to the TRAMOC survey from 2002 and the survey we made in 2010 on *Kim Mã* Street, there were 203 268 passengers per day[6] by motorcycle in 2002 and 246 012 in 2010. We noticed 14 160 passengers per day by car in 2002 versus 45 120 in 2010; by public bus, from 30 000 to 48 000. This increase of traffic had two significant consequences: firstly there is an increase of road occupancy by the different means of transport and secondly an increase of fuel consumption, which directly affects the air quality of the city.

In 2008, requested by the DOT, in the framework of the Ecotrans project, TRAMOC had led a survey with innovating approach. To give another vision of traffic congestion and its consequences other data as road space occupancy and fuel consumption has to be taken into consideration (*Figure 3*).

10 counting sites (5 into the Ring Road No2 - *Đường Lạc Long Quân, Đường Bưởi, Đường Láng, Đường Trường Chinh, Đại La, Minh Khai* - and 5 beyond) had been taken in consideration. The sample was chosen with the intention, to catch the busiest time on the busiest roads at the critical time, when traffic jams are frequently reported. The method allows a rather exact accounting for the modal split, at this time and for these roads. As a result, we can underline that cars account for only 4% of people transported, but occupy nearly 20% of road space. The bulk of Hanoi transports are motorcycles. That the heavy traffic of Hanoi is still flowing is thanks to the very efficient road use of this mode of transport. 80% of road users use only 62% of road space. As well, even if 70% of fuel consumption is attributed to motorcycles, cars represent a 20% share of total consumption.

[6] The number of passengers on the Motorcycles has been calculated be 1,3 per vehicle; Cars 2 persons according to international standards, Public Bus according to Tramoc Survey 50 person on Kim Ma per bus, Other busses with an average of 25 persons.

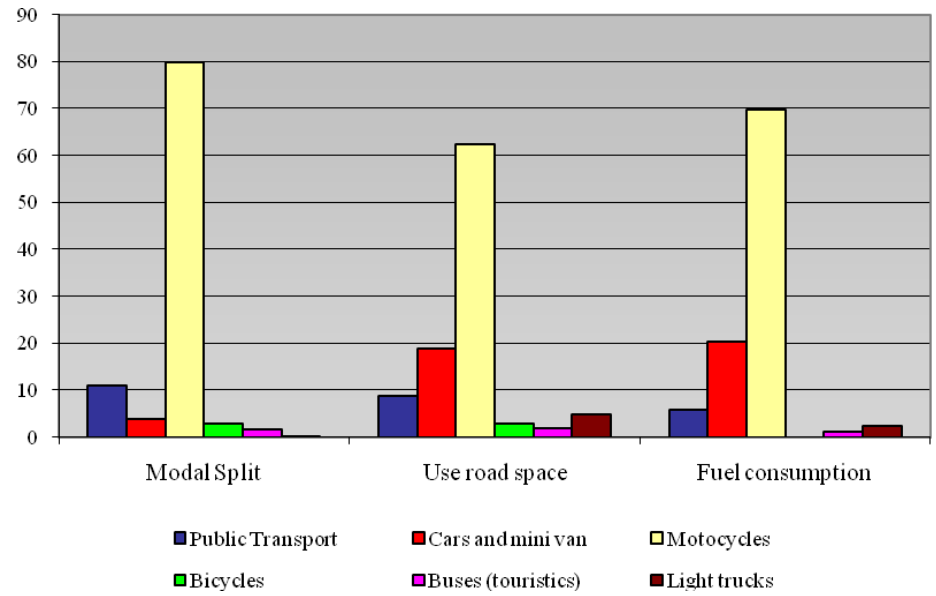


Figure 3: Means of urban transport in Hanoi in 2008. Comparison between the modal split, the surface occupancy of the road and fuel consumption (data expressed in %) (Source: Tramoc, 2008)

Until now, there is no clear figure about the number of cars in Hanoi. According to the Nguyễn Quốc Hùng (2010), the city has about 302293 automobiles of all types while a study estimates an increase of cars by nearly 14% per year (Tramoc, 2010). But these figures show only the amount of cars, which are registered in Hanoi. The huge amount of cars which are registered in the neighbouring provinces but occupy as well the roadway in the capital city is not shown in this figure. That's why, according to Nguyễn Quốc Hùng (2010), land reserved for transport development is still at a too low rate – for the moment only about 6-7% of the total urban land area. It seems the answer should be the construction of roads: by 2030, the density of main roads in the city must reach 3.5-5 km² and the land for transport accounts for 20-25% of the land allocated for urban development.

The literature on urban transportation emphasizes often the increase of private vehicle (and clearly the increase of car ownership) is directly linked to the growth of the GDP per capita. Hanoi has got a remarkable economic growth, around 10% per year. The aim of the authorities is to keep a sustainable economic growth. So the shift to the car should be taken in consideration in order to set up policies as: car parking organization, toll, and restricted inner city area in order to contain this asphyxia.

1.2/ Additional problems in Hanoi:

As the mass media often underlines, traffic is a major issue in Hanoi and decision makers as well as the different administration bodies (HPC and the central level) take the problem seriously. The city is on the brink of traffic collapse, and considering the urgency, authorities have to find a way in order to solve congestion problems for the short term, while proposing a plan for the long term. Nevertheless, there are additional problems that slow down the development of a transportation system.

Firstly, the saturation of traffic on the roadway is also amplified by the singularity of the urban form of the city. Planners have to respect and take into consideration this shape that results from the historical process and construction of Hanoi. The inner city roads are often short and narrow: among the total roads in the urban area nearly 70% of the existing roads are less than 11m of width. There are many paths even less than 5m wide, especially in neighbourhoods which were built during the period of self-production (Pandolfi, 2001, p.313) that accommodated nearly 79% of the urban population in 2004 (Khuat Viet Hung, 2006, p.126). Vehicle transit is limited in those areas and only two-wheelers can access. Within the Ring Road No2, the urban shape is a constraint that needs to be taken into account in the traffic management and regulation.

Narrow roads are at the edge of capacity during rush hour in the City Centre, Photo: C.Molt 2010

Secondly, the institutional re-organization of transport authorities in Hanoi in 2007 and the expansion of the capital area that has been multiplied by 3 in 2008, pose new problems to the administration. The administrative departments are slow to adapt to both the new organization chart and the new territory organization. It is not only the reorganization of the administrative setting which has to be managed, it is also to consolidate the urban development master plans and transportation plans that had been designed and approved before 2008. These are great challenges to overcome for a city, which at the same time faces rapid economic development.

To conclude this part, solutions came up a few years ago. In order to solve congestion, local authorities stopped to register motorbikes in Hanoi – as a consequence there were higher numbers of vehicle registration in neighbouring provinces. In parallel, scholars presented recommendations in order to reduce motorbikes like annual tax on vehicle, tax on gas, tax registration fees, tax on the purchase of new motorbikes (Cusset and Luu Duc Hai, 2001). But the same scholars indicate that the public opinion was not in favour of such fiscal tools. Nowadays, the discourse on urban transportation policies shifts from the simple reduction of vehicles to a comprehensive concept of a sustainable urban transport. It is now used by decision makers as well as institutions and administrations in order to achieve urban sustainable development goals.

2/ Public transportation and sustainability as a new stream for urban transportation policies

There is no universally accepted definition of sustainability or sustainable development (Beatley, 1995), but rather there are many definitions of sustainable transport, and of the related terms sustainable transportation and sustainable mobility. A brief literature insight shows that sustainability is a matter of environment, society, economy, long term planning and integration of sectors. These are key elements for the common understanding of sustainability.

In the context of sustainable urban transportation the definition of the European Union Council of Ministers of Transports[7] is often used as one of the definitions. In our paper we will follow that definition as well as the above mentioned key elements for sustainability which are also important for the transport planning in the Vietnamese context. According to this definition, sustainability:

- Allows the basic access and development needs of individuals, companies and societies to be met safely and in a manner consistent with human and ecosystem health, and promotes equity within and between successive generations.
- Is affordable, operates fairly and efficiently, offers a choice of transport mode, and supports a competitive economy, as well as balanced regional development.
- Limits emissions and waste within the planet's ability to absorb them, uses renewable resources at or below their rates of generation, and uses non-renewable resources at or below the rates of development of renewable substitutes, while minimizing the impact on the use of land and the generation of noise.

In Vietnam, the first official reference to the term "sustainability development" (*Phát triển bền vững*) appears in 2001. During the 9th National Congress of the Communist Party of Vietnam, several

[7] ECMT (2004*), Assessment and Decision Making for Sustainable Transport*, European Conference of Ministers of Transportation, Organization of Economic Coordination and Development (www.oecd.org); www.internationaltransportforum.org/europe/ecmt/pubpdf/04Assessment.pdf.

policies were approved referring to this concept. Its general purpose includes fast and sustainable economic growth, stable improvement of the living standards of the people, external economic relation enhancement, human resource development, job creation, hunger eradication and poverty reduction[8]. In 2004, the first plan as known as the Strategic Development Plan of Transport Vietnam 2020 was developed, in which strategy development of urban transportation was approved by the Prime Minister (Decision No. 206/2004/QD-TTg on 10/12/2004). In the Hanoi urban transport sector, there are different stakeholders who make reference to those strategic orientations and who are involved in the elaboration of transportation policies[9] .

2.1/ Differing views on sustainable urban transport

In order to understand how transportation policies are defined and implemented in Vietnam, especially Hanoi, we interviewed different representatives of the local and central institutions, who are dealing with sustainable urban transport.[10] One key question was to find out how sustainability is understood, how planning process and implementation work in the Vietnamese context and which components, with regard to the above mentioned definition of sustainability, play a role in the end.

To understand the planning process and policy making in Vietnam, one should know that there is still a very strong influence by the central system and politically driven mechanisms, especially in the case of the capital Hanoi which has the rank of a "special city". The legal frame for the development of the transport system in Hanoi is given by the Prime Minister Decision No. 90/2008/QD-TTg. Although this decision has to be updated due to the expansion of Hanoi in August 2008, it still stands as the legal frame for all stakeholders who are in charge to develop the transportation system for Hanoi.

Orientation rather than definition...

There is no clear definition of a sustainable urban transportation system. It is rather a strategy plan, or better, it gives orientations for the general steps that should be followed. The emphasis lies on the "building of a modern inter-modal transport infrastructure and effective transport system, which should be developed in synchronism with other planning, especially the planning on urban construction and population distribution" (Decision No. 90/2008/QD-TTg). Two main measures are indicated to get there: first, investment in the development of a road network and second, the development of a mass transit system (with the goal to raise the passenger ratio to around 35-45 % by 2020). As a consequence, urban transport planning in the past years focused on improving the road network and the development of a mass transit system as a long-term goal. But the time it takes for the projects to reach that goal and the emergency of current traffic problems put a lot of pressure on decision makers, which led to a wave of reviewing the interpretation of a concept for sustainable urban transport planning and attempts to get to a broader view of transport planning.

According to TDSI, who is the Think Tank for strategic planning of the MOT, there is no clear definition for sustainable planning in Vietnam yet, however, it is a goal set for the near future. Institutions like TDSI (as well as representatives from the University of Transport and Communication) are not restrained due to a lack of definition though as they have access to other sources. Both institutes work as local consultants in international projects funded by the World Bank, ADB or JICA, are familiar with the regulations and requests set by those institutes for sustainability, environmental and social impact assessments. Thus they define sustainable urban transport as a

[8] http://www.cpv.org.vn/cpv/Modules/News_English/News_Detail_E.aspx?CN_ID=413221&CO_ID=30180#tBAtAMWp3TAC (last accessed 15 August 2010).

[9] Ministry of Transport (MOT) and its administration such Vietnam Railway Administration (VNRA) or Vietnam Road Administration, Transport-Development and Strategy Institute (TDSI, public organization under MOT), Transportation Engineering Design Incorporation (TEDI, private organization linked with MOT), Department of Transport (DOT, department which belongs to Hanoi People's Committee), the TRAMOC (Hanoi Public Transport Management and Operation Center, under the DOT) the Vietnam Road and Bridge Association, the Hanoi Road and Bridges Association.

[10] For this paper a dozen of interviews had been done with representatives of public Vietnamese transport administration as MOT, VNRA, TDSI, TEDI, DOT, TRAMOC, the Vietnam Road and Bridge Association, and several professor and domestic consultant from the University of Transport and Communication, and University of Construction.

combination between environmental, social, technical, economic and financial factors, which have to be taken into account in every project. In this regard, these institutions are considered to have the most comprehensive approach to sustainable planning in Vietnam.

Traditionally, Vietnam has basic principles for sustainable transport, including terms like: "comprehensive", "integrated", "efficient". These terms have to be supplemented by "environmental" and "safe" components in order to be sustainable. This approach is shared by other institutions in Vietnam, from the central to the local level, even though their approaches might be more technical.

One key factor, which was expressed by all interview partners, is that the improvement of the Public Transport System is essential in order to reach the goal of sustainability and reduce gas emissions. The main focus of the DOT obviously is the public transport. As expressed by TRAMOC, the current strategy of sustainable urban development in Hanoi is not only the focus on long-term projects for the metro and dedicated bus lanes; it is also the development and improvement of the current bus network. This is not only a basic short-term and midterm goal, but also necessary in order to develop important projects like the urban railway line that will be completed in the future. In parallel, according to TEDI, sustainability means decreasing pollution, providing an attractive and comfortable public transport network, working on the accessibility and inter-connection between the different means of transport.

Although representatives of the institutes involved have quite a broad picture on the concept of sustainable transport, they observe that in Vietnam, most projects only aim for technical sustainability, which means providing a good structure and engineering approach in order to build bridges and roads. This can be explained by the fact that in Vietnam there is an old-established way of planning which can be seen as a philosophical approach that did not really change since the 50s. It is an architectural planning concept and not really based on scientific analyses (as economic or travel demand). As a result, the plan depends of the specific political vision, and those who decide for a plan finally decide for everything. The risk of failure is high because the plan does not include an analytical approach based on a comprehensive view, integration, efficiency and safety.

TDSI resumes that sustainable urban transport as a nationwide concept mainly focuses on public transport oriented infrastructure in order to reduce the individual transport. However, the planning process faces many shortcomings. Policies are not strong enough and the decision making process is slow. In addition, there is a lack of financial resources, and even if there are ODA funds, there is a lack of knowledge on how to efficiently use that resource. For both, the DOT and HPC do not have sufficiently trained staff and there is no frame to refer to concerning urban sustainable transport. There is neither law, nor decree. Studies have been conducted by TDSI, TEDI and the University of Transport and Communication recently to set a new direction for the discourse, but so far, they remain theoretical and lack support for being put into practice.

...while domestic and international experts try to express a clearer idea

With a view to the urgent transport problems in the two major cities Ho Chi Minh City and Hanoi, there had been two conferences[11] on Sustainable Urban Development in 2010, where scholars and representatives of the MOT, DOT of Hanoi and DTC of HCMC tried to define a concept. The MOT[12] recognizes in a concept paper sustainable urban transport as following:

> *The development of sustainable urban transport is base on a process which ensures the balance between the social economic development objectives and the environment protection. Sustainable Urban Transport is an integral part of the wide urban sustainable development; it depends on the process of planning and urban development, and has a direct impact on the cities' sustainable development.*

[11] Conference on the Sustainable Urban Development organized by the HIDS (Ho Chi Minh City Institute for Development Studies) on 17/05/2010 http://www.hids.hochiminhcity.gov.vn/lietkemuc.asp?cap=3&idcha=6059 ; *International seminar on sustainable development of Hanoi urban transport* organized by DOT, the Road and bridges association of Vietnam and the Road and Bridge association of Hanoi on 25/06/2010.

[12] Paper available at http://www.hids.hochiminhcity.gov.vn/Hoithao/phattrienbenvung/vuvantaibogtvt.pdf (paper written in Vietnamese).

The proposed approach includes economical, environmental and social aspects which are combined with the previous definition. Economically, sustainable urban transport must first establish a transportation system to support better economic development of the city, improve the mobility and strive to reduce displacement cost. Environmentally, sustainable urban transport has to minimize pollution and socially ensure the right to travel of all the citizens. Accordingly, the transport planning will focus on sustainable development criteria, development of public transport modes, the control and restraint of the increase in private vehicles, the control of traffic in the core and central urban areas, with a priority to centre axes, expressways and ring roads.

Representatives of other institutions follow the main definitions that have been set by scientific institutions like TDSI or the University of Transport and Communication. What they have in common is the fact that the definitions are kept so vague that there is enough room for a myriad of explanations and interpretations. Moreover, there is much encouragement from Vietnamese authorities for an exchange between international and domestic experts, for researching and for sharing ideas, experiences and best practices. Hence the ball is thrown back to planners, consultants and international consultants to find the best solution, with investment from outside in order to reach the overall goal of a modern and sustainable city. Here lies the main problem, as investors are more market oriented with high expectations to reach the threshold of profitability; thus economic efficiency is pushed back into the focus of actual development.

According to our interview survey, there is one point that hardly appears in any definition, which is the concept of "liveable cities". The idea of reducing the travel distance by developing cities that promote mixed-use quarters, walkable streets or the use of bicycles - aspects we find in European cities as well as other western countries and some Asian cities - is hardly discussed in the Vietnamese context despite a large number of recommendations, orientations and a broad consensus that this concept is actually desirable. Sustainable urban transport is first understood as a blurry goal to develop a public transportation network. Urban transport is subsequently stressed as a way to get sustainable transport equipment, which will contribute to the sustainability of the city's economic development. Environmental issues are taken into consideration through brief environmental assessments and risk analysis, and the social aspect is treated simply by proposing affordable transport for everyone.

2.2/ Main idea: the improvement of public transportation

As we stressed, through our interview and legal and official text review, the main and strongest idea on how to reach sustainability is to develop public transportation. In Hanoi, the history of public transportation is significant. In the past, the capital of Vietnam was well known for its tramway and trolley bus service. Nevertheless, in the post *Đổi Mới* period, public transportation has started to collapse. Several reasons can be given: (i) subsidies to the Hanoi Bus Company dried up as part of the general economic restructuring program, (ii) spare parts from former suppliers in the disintegrating Soviet bloc became less available and required hard currency payments, and (iii) the motorcycle market was liberalized. To this can be added that (iv) the population's dissatisfaction with the service level that the old public transportation system provided. In a market economy, this brings people to turn away from public services and to providing their own transportation.

Hanoi Tramway in the 1980s, Photo : F. Henry, Paris

Hanoi Trolley Bus 1990, Source : Tramoc Data Base

Since 2000, with the support of the German cooperation CIM and the decentralized cooperation led by Ile de France Region, TRAMOC (created in 1998) carried out two international projects, namely Asiatrans and Ecotrans (co-funded by European Union). Also, bus operator companies have been reorganized through Transerco holding company (which is now the main bus operator in Hanoi). As a result, the service has significantly improved. Public transportation has received a substantial boost; the number of passengers has increased impressively every year and was multiplied by 30 in only 8 years (from 12 million users in 2000 to 400 million in 2008, to nearly 600 000 passengers per day in 2008). The service and its quality were improved as well, by creation of new bus lines and their reorganization, adapted bus frequency and schedule, and by the implementation of bus interchanges.

Today, planners are coming up with a multitude of plans, proposals and new ideas in order to improve the current public transport in the capital. With a view to the implementation of transportation megaprojects, those plans should be assessed with the objective of putting relevant ones into practice to improve the current situation. Among these plans, we can find for instance the "Development of Public Bus Transport in Hanoi in 2010 - Orientation to 2020" that aims to (i) increase the number of people using buses, while reducing the number of trips by personal vehicle; (ii) resolve traffic congestion in urban centres, on the road from the centre to the planned satellite cities and at major intersections; (iii) reduce fuel costs in transportation, reduce harmful emissions from vehicles; and (iv) reduce the severity of traffic accidents.

However, in order to improve public transportation, several measures have to be taken. The bus network requires a re-organization and the bus network accessibility has to be enhanced. A special focus should be put on the new urban areas, which are not sufficiently covered by public transport. A greater coverage will promote higher effectiveness of the system by reducing duplicated lines and thus reducing waste of service. It is also essential to enhance the service quality. This can be achieved by: improving the service frequency on each line and limiting the waiting time; providing new ergonomic and comfortable buses in order to compete with private vehicles; equipping new bus fleets by ecological vehicles (like hybrid buses); and enhancing the infrastructure and design of the bus stops to make them and the bus itself easily accessible, especially for the elderly, disabled and children.

Actually, two main strategies are being developed in Hanoi to accommodate the urgency to act in order to solve the current traffic condition, as well as the long-term goal of sustainable development. For the city, both plans are clearly defined: in a short term, elevated roads will be built, in a long term, a comprehensive PTS will be set up. The short-term proposal received a lot of comments and criticism in the local newspapers and on websites. The long-term plan is a relevant solution, its construction seems to be supported by international donors and foreign investors, while its management and its future operation needs further consideration of the authorities.

3/ The Hanoi Public Transportation System: a jeopardized answer?

In 1998, the Prime Minister approved a new Construction Master Plan for Hanoi (by Decision No 108/1998/QD-TTg). In addition to the large content of this planning document, it gave orientations to the Capital of Vietnam in order to build a comprehensive urban transport network, which comprises a Public Transportation System based on urban railway tracks. Due to the difficult and time-consuming planning process in Vietnam, with planning documents being swung back and forth between ministries and governmental agencies, it took nearly 10 years to get a definitive approval for the basic orientations of the urban transportation sector. This approval was eventually given through the Prime Minister's Decision No 90/2008/QD-TTg.

Among several transport infrastructure projects (for roads, highways and bridges), the Public Transportation System is a crucial part of the plan. The improvement of the public transport network would contribute to building a modern capital and would improve the difficult traffic conditions in the city. In general, the choice of public transport seems to be considered as a "cure-all" for urban mobility. Some cities, such as Vancouver, Portland (Oregon) and Copenhagen, gave radical orientation and priority to develop public transportation. In this slipstream, Asian cities with serious congestion issues, such as Hong Kong, Singapore or Seoul, tried to improve their transportation situation accordingly. These cities share a common history for having strongly reduced motorization for a significant period of time at an early stage, and for managing to maintain bus based public transport usage at high level until mass transit became affordable (Barter, 2004). Hanoi seems to wish

to take the same path. Even if congestion is present, and mainly caused by individual vehicles, the shift to the car has not taken place yet. However, when we focus on the mass rapid network developed so far in Hong Kong, Singapore or Seoul, these networks are known for their high integrated level (Lo, H., Tang, S., Wang, Z., 2008; Ibrahim, 2003; Pucher, J., Park, H., Kim, M.H, Song, J, 2005).

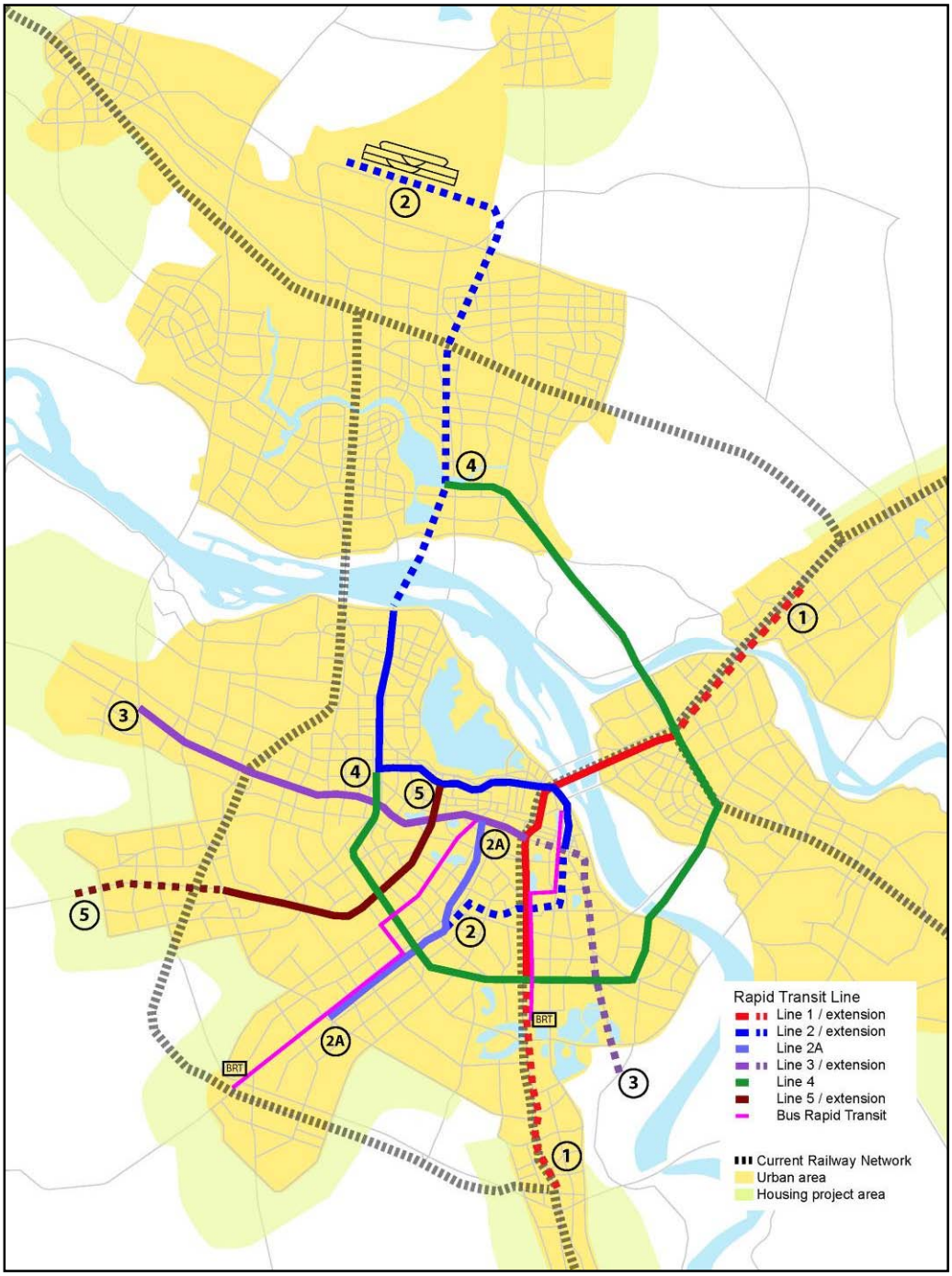
Thus, the realization of an integrated Public Transportation System could be seen as a guarantee of sustainable urban transport as well as an indispensable condition. In Vietnam, if the concept is expressed by policies and political orientation though, it has to be combined and applied through physical, operational and institutional fields. In the following part, we present the Public Transportation System planned in Hanoi until 2020 and we examine its planning and its implementation through the integration concept prism.

3.1/ Hanoi Public Transportation Plan until 2020

As we stressed, the Decision No 90 produced the framework and the main orientation for urban transportation and the public transportation development until 2020. However, since August 2008, Hanoi has expanded its administrative territory. Therefore, the capital was obliged to prepare a new Construction Master Plan. Within this planning document the main orientations and all the transportation projects (including those dedicated to public transport) which had yet started up would be integrated in the future Hanoi Capital Construction Master Plan to 2030 and Vision to 2050. This would be approved in October 2010. The first six rapid transit metro lines that are already being studied will be kept by the new Master Plan. In addition, the plan of the current bus public transport carried out by TRAMOC and the DOT will be reviewed and adapted to the new city shape.

The *figure 4* presents the main rapid transit lines, which include also the BRT lines and their extension until 2020. Additionally, the *table 1* gives an overview of the rapid transit lines which are being studied. Until now, the 27 km from the Line No 1, the 13 km from the Line No 2A, the 17,2 km from the Line No 2, the 12 km from the Line No 3 and the 29 km from the BRT line are currently being examined. Construction works are planned to begin at the end of 2010, marking the city's celebration of its 1000-year anniversary. It means that in a few years, the Hanoi rapid transit line would have nearly 100 km of network.

Figure 4: Rapid Transit Network until 2020 (Based on the Decision No 90/2008)(by C.Musil)



Network	Lines*	Way	Length (in km)	Number of stations	Construction	Donor / Investor	Implementation agency	Proposition for Commercial operation	Estimated cost (in million USD)
MRT LRT	Line No1	Ngọc Hồi - Yên Viên	27	16	Elevated	Japanese ODA	Ministry of Transport / Vietnam Railway Administration	Phase 1: 2015 Phase 2: 2017	Phase 1 ≅ 1 000 Phase 2 ≅ 500
	Line No2	Nam Thang Long – Tran Hung Dao - Thượng Đình	17,2	15	Elevated and Underground	Japanese ODA	Metro Rail Transport Project Board / Hanoi People's Committee	Project 1 : 2016 Project 2 : 2018	Project 1 ≅ 1 200 Project 2 ≅ 700
	Line No2A	Cát Linh - Hà Đông	13	13	Elevated	Chinese Investment	Ministry of Transport / Vietnam Railway Administration	2013	≅ 550
	Line No3	Nhổn - Ga Hà Nội - Hoàng Mai	21	20	Elevated and Underground	French ODA (and Asian Development Bank and European Investment Bank)	Metro Rail Transport Project Board / Hanoi People's Committee	Phase 1: 2015 Phase 2: 2017	Phase 1 ≅ 1 100 Phase 2 ≅ 600
	Line No4	Ring (link between lines 1,2,3 & 5) Đông Anh/Sài Đồng/Vĩnh Tuy/Thanh Xuân/Bưởi/Từ Liêm	53,1						
	Line No5	Nam Hồ Tây - Ngoc Khanh - Lang Hòa Lạc	33,5	22	Elevated and Underground	Korean investment	Ministry of Transport / Vietnam Railway Administration	Phase 1: 2013 Phase 2: 2017	Phase 1 ≅ 574 Phase 2 ≅ 653
BRT	Line No1	Ba La - Nguyen Trai – Khuat Duy Tien – Lang Ha – Kim Ma	13	every 350 – 500 m	On ground	World Bank	HUTDP Project Management Unit / Hanoi People's Committee	2011	≅ 65 (for the BRT basic infrastructure)
	Line No2	Vinh Quynh - Giai Phong – Dai Co Viet – Pho Hue - Hang Bai	10,9		On ground	World Bank	HUTDP Project Management Unit / Hanoi People's Committee		
	Additional BRT Line	Soc Son – Dong Anh – Kim No – Me Linh – Vinh Yen	33,9						

Table 1: ***Infrastructure plan for the Hanoi Public Transport System*** *(based on Dự án phát triển giao thông đô thị Hà Nội (HUTDP) (11/2007), Decision No90 (07/2008), Dự án Đường sắt đô thị Hà Nội, Tuyến số 5(11/2008), Luu Xuan Hung (2010).*

In this part, we are not giving an analysis focused on the characteristics of the urban transit network[13]. Nevertheless, the comprehensive public transportation network can be subject of a wide assessment: while the different overseas and domestic engineer firms did pre feasibility studies and risk analysis line by line, the network can be examined in its global shape. Beyond technical aspects, some comments can be done.

Firstly, the cost of this Public Transportation plan is immense. It can be seen as an addition of costly megaprojects. According to the DOT assumption, its implementation would reach nearly 9 billion USD. As the expense will be so high, Vietnamese authorities must attract investors and need the assistance of international organizations in order to finance, design, build and operate this comprehensive Public Transport System. As a consequence, there is a myriad of stakeholders involved. From both the domestic and foreign side, there are many companies, contractors, sub-contractors and advisors. The increasing number of stakeholders involved is accompanied by a number of obstacles: There are different Project Management Methodologies (in the framework of the Project Management Unit; the unbalanced knowledge between foreigners and local engineers and the knowledge sharing (the experience of the overseas engineer who had worked on an underground metro project on one hand and the lack of experience from the Vietnamese part on the other); the increasing competition between subcontractors or other private engineering companies who will compete to obtain new markets (for instance to equip the different lines with new technologies, such as "smart card"). Even though the plan is partially under realization, the problem remains: how could this large system be financed? As we stressed in Table 1, some projects still have no investor and even if they officially do, like Line No 5 (*Hòa Lạc - Nam Hồ Tây*), the situation might change due to bidding re-launched by Vietnamese authorities.

Secondly, the proposition for the commercial operation and estimated cost can seriously vary. Megaprojects have enormous costs and are risky by nature. The research led by Bent Flyvbjerg (2007a) on large infrastructure projects stressed the problem of the cost escalation for infrastructure projects like urban rail. According to this author, the main problem in major infrastructure development is a pervasive misinformation about the costs, benefits and risks involved. His study case, based on the urban rail of Copenhagen, underlined an average cost escalation for urban rail of 45% (Flyvbjerg, 2007b). The biases in the cost estimation impact seriously the cost benefits of the project because of the delay of the operation. Moreover, extra funds are necessary in order to cover the extra expenses. In Hanoi, many cases of road construction and road enlargement send a strong signal on this issue to the experts. Delays in the transport infrastructure implementation are quite common in the Capital City. The example of the *Kim Liên-Ô Chợ Dừa* boulevard is always put upfront by the media as the "most expensive urban road in the world". The delay and the high expense are mainly caused by the "land clearance process" and the amount of compensation which is cruelly underestimated in the pre feasibility studies. Therefore, for a metro line implementation, land acquisition problems would also provoke increasing expenses, which would force the Vietnamese authorities to attract other investors and would increase the number of stakeholders. Even if there was an investor, all budgets are not settled: material prices increase (due to inflation) and the technical option (elevated, underground or on ground) can also be changed.

Beside the issues of several stakeholders, the Vietnamese authorities and implementation agencies have to coordinate in order to provide efficiency. But in order to get a sustainable urban transport system, not only coordination but also integration from the policies to the construction phases and the operation is needed.

3.2/ Sustainability of the Hanoi Public Transport System questioned by the "integration prism"

As we have already mentioned (see Part 2), sustainable urban transport in Vietnam is mainly orientated on a principle which is focused on reducing the environmental impacts of transportation activities, solving the issue of traffic congestion and developing a PTS. Among the criteria of

[13] Vuchic, V.R., (2005) in his large contribution titled *Urban Transit Operation, Planning and Economics*, gives methodological approaches in order to analyze the geometry of transit lines and networks.

sustainable urban transportation, the concept of integration appears. But as for the sustainable urban transport concept, no details are given in order to fully understand the meaning of a public transport integrated system.

Some research was conducted in Venezuela when the authorities had built the metro line in the early 1990s (Ocana Ortiz, 1993). Those scholars stressed the failure of the integration between different transportation modes. At this period, when the sustainable development discourse was starting up, the integration approach in the transport sector was based on "network structuring" and "network organization" (Ocana Ortiz, 1993). Nowadays, it is a multidimensional criterion, which is crucial for the success of an efficient and effective public transport network. For international donors who are involve in the construction of the urban transportation network in developing countries, "the transport system cannot be sustained unless adequate integration and clear and secure financial channels are available. If sustained funding of mass transit systems is not ensured the city itself is jeopardized" (World Bank, 2000).

3.2.1/ Why is integration a criterion for sustainability?

An integrated PTS will be able to attract more people and will transport the majority of the urban population. As a consequence, the goal of a sustainable urban transport might be reached, the accessibility and mobility in the city would be enhanced and provided to all citizens, who would not only benefit from an improvement in terms of transport, but also in terms of air quality, and thus quality of life. But in order to reach this goal, integrated principles have to be followed. An integrated public transport network is based on the following principles:

- Urban planning integration: is the integration of land-use and transport. A lot of research has been accomplished on this issue; the transport and urban planning integration contributes directly to the reduction of traffic congestion, gives orientation to the reduction of private vehicle use and accounts for the improvement of the urban environment (Barter, 2000; Petersen, 2002; Wee and Maat, 2003; Kenworthy and Townsend, 2006; Geurs 2006). In summary, the objectives are to reduce the traffic demand (and develop Transit Oriented Development), to opt for accessibility rather than mobility, to give priority to mixed land-use approaches (by integrating different land uses and building types to create vibrant, pedestrian-friendly and diverse communities), to provide and reserve land for transport infrastructure through planning tools and planning policies.
- Physical integration: deals with the transfer of passengers, to shorten transfer distances and to maximize the efficiency of the transfer itself. The aim is to ensure the continuity of flows of movements. To integrate is this regard to redraw networks to make them coherent among them, treated on a hierarchical basis, as well as with a complementary approach. Also, the places of interconnection need to be specified. This integration requires more than a simple physical nearness. The idea it is to pass on to the user the sensation of a continuous journey that is safe and comfortable.
- Institutional integration: consists of the coordination of the participating bodies in the transportation sector. It determines and defines the role and the responsibilities of stakeholders, sets up rules and contracts, therefore must be led by a specific and dedicated agency. According to World Bank (2000), it does not have to be necessarily rigid nor provided with large resources, but its functions and responsibilities have to be clearly defined from the start. This is the foundation for a well-functioning agency in order to build, to enforce and to apply integrated transportation policies.
- Operational integration: implies the establishment of a homogeneous model of operation and the compatibility of the operation modes of transport, taking into account all different means of transport. The operational integration is the coordination between the various operators on operation schedules and the adequacy of the offer to the demand.
- Fare/tariff integration: intends to allow for travelling in different transit systems with a single combined ticket to avoid the use of new tickets or, generally, additional cost. This can be achieved in different ways that vary from combined tickets that allow travelling in different transport systems during a set length of time or multiple tickets and even monthly personal travel passes that

authorize any number or type of trips within a specific area. The fare integration, which is the result of a social policy as well, should be fixed in order to attract and increase the number of passengers.

- Image integration: is a part of the territorial marketing policy that a metropolis has to set up in order to shape its brand image. The transit line network as a whole should provide a global service to users while having a concise identity.

The integration is expected to be beneficial to users, since it should increase their travel options, and facilitate the combined use of different services. At the opposite, lack of integration can lead to a failure of transit systems in terms of: poor service, poor ridership numbers and poor revenue for operators. Finally, a poor integration would weaken the PTS and compromise the achievement of a sustainable urban transport.

3.2.2/ Hanoi Public Transportation and its integration challenges:

In Hanoi, this issue is under discussion between several stakeholders, both domestic and international (see *table 1*). These stakeholders are now building a new network which has to compete against the individual means of transport.

In order to make sure the future PTS competes with other means of transport, its shape and conception has to be based on an integrated approach. Until this point all the stakeholders agreed. Of course, in order to have an efficient and successful public transport network, there is a consensus on what should be the integrated approach. But difficulties appear in the details. Here we give an insight of the difficulties those actors would have to solve during the next few years in order to reach the goal of sustainable urban transport. As we presented in the previous part the content of integration concept apply to a PTS, we examine through different angles where the sustainability challenges are played and where the discussions are for the Hanoi network.

Urban planning integration:

Several domestic and overseas urban planners are advising Hanoi to opt for an integrated and strategic approach rather than a sectorial planning approach, which led to an unsynchronized development of urban development and transportation network (Wilson, 2009; Luu Xuan Hung, 2010). Concerning the urban railway network, this integration shall create benefits by providing a high quality and effective public transport service thanks to a good linkage, both among railway lines and with other urban transport modals; by maximizing value of land use along the corridors and surrounding the stations; by improving the environmental quality, living conditions and socio-economic activities. This integration can be reached using the Transport Oriented Development concept, in order to reduce the traffic demand. So far, this is the goal of the government and its agencies.

But some difficulties appear. Indeed, several new urban areas (*Khu đô thị mới*) are developed in Hanoi. Until now, for those, which are built and where people live, there is a lack of, mainly social, infrastructure. Clinics, kindergartens and schools are missing. New areas such as *Linh Đàm* and *Trung Hoà Nhân Chính* are good examples to underline the lack of key services[14]. As a result, this time lag between the achievement of housing program and social infrastructure push inhabitants to use more roads and to travel within the city, and thus overcharge the road infrastructure. Clearly, it increases the traffic demand.

Local authorities try to respond. The current public transport, as the bus service is mainly operated by Transerco and managed by Tramoc, adapts itself to the fast changing urban shape. Tramoc and other bus operators deal with the situation and strive to provide a bus service to those new urban areas. Stakeholders who are in charge to manage PT in the city have in mind to bring public service where the people are.

Finally, the most worrying problem that local authorities have to deal with is the land issue. “Land Clearance” and “land acquisition” are the procedures, which delay and interfere with the infrastructure building. Clearly, this problem is related to a severe lack of management of the land use and the

[14] http://vietnamnews.vnagency.com.vn/Social-Isssues/201638/New-urban-areas-lack-key-services.html and http://english.vietnamnet.vn/social/201003/Ha-Noi-urban-planning-falls-short-897366/

capacity of the administration to get enough Right-of-Way in order to develop an efficient PTS. This issue runs for a while now and the debate reaches also the land legal framework and the resettlement policies framework.

Another planning problem: new residential areas host too many professional's activities. As a result: a lack of car parks. SUV parked on the sidewalk, The Manor. Photo: C. Musil

Physical integration

As we have already indicated, physical integration aims to facilitate the passenger's transfer from one means of transport to another (or to the same means of transport but into a different transit network). In Hanoi, the physical integration is particularly important, as it requires the integration of different lines and different technologies. As the rapid transit lines (LRT/MRT/BRT) would become the dorsal spine of transportation and as they request heavy infrastructure construction and they are irremovable, the bus network will become a complementary network (and the most flexible one), which would connect with this main rapid transit network.

First, the reorganization of bus lines would be a priority. This would follow two objectives: reducing duplicated bus lines and facilitating the connection and accessibility between bus stops and MRT/LRT/BRT stations. Within the bus line reorganization, the discussion is also focused on the duplicated bus lines, which would follow metro lines. This can be seen as a waste (as a competition between different modes which are PT), but also as an asset because bus lines can provide intermediate bus stops in between metro stations.

Second, physical integration is obviously needed at the intersection of two lines of the same means of transport. In order to settle these connections, the coordination between PMU is a *sine qua none* condition. Their planning would have to take place in an early stage of the feasibility studies. However, as each PMU is working independently and facing different issues, notably the issues of land acquisition and technical constraints in particular for the underground parts, the design of one project might change, rendering impossible the linkage to another. Furthermore, aside from the difficulties in connecting lines, there is an architectural challenge as well when planning those connections, as it is crucial that the stations themselves are designed in a way that advocates a fast and smooth transit. Connections fail if the ways inside the station are too long or too difficult, and if paths are poorly marked. The transit points might thus become the weak points within the network.

Facing the issues of physical integration, Vietnamese professionals keep debating with different implementation agencies. To illustrate the challenge of physical connections, we cite three specific situations as examples: Cat Linh/Kim Ma Transfer Area (Line 2A, 3 and BRT), Hanoi Railway Station (Line 1 and 3 – one underground, one elevated and the connection to the national/provincial railway service) and Nguyen Trai Corridor (BRT / line 2A) (see next page).

Last, not only the projects need to be coordinated, but also their implementation schedule. Any delay would complicate connection issue further. The first lines to be built impose a hierarchy (the following ones have to connect to the stations), and solutions have to be found in order to ensure effective connection. Also, other issues to be considered are the physical connection that has to be done with the current bus network, the creation of easy walking access to the station, providing motorbike parking and bicycle parking. One more time the physical connections involve the land use integration.

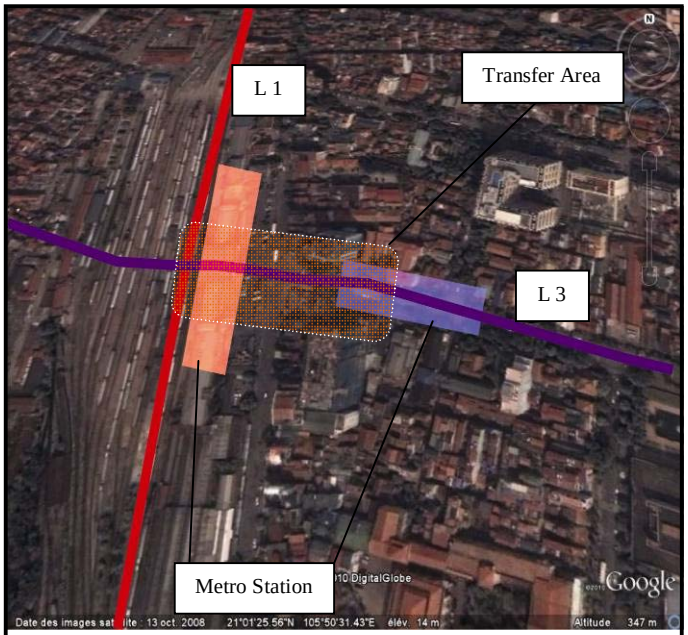
Example No 1: Cat Linh / Kim Ma Transfer Area

Lines: BRT No 1 / MRT No 3 / LRT No 2A

Level connection: on ground/underground/elevated

Stakeholders: World Bank, AFD, ADB, EBI, Chinese Investor, Systra, HRB, HUTDP HPC, VNR…

Comment: Connection between LRT and MRT lines are being studied by both project management boards (HPC and VNR); BRT connection should be accessible in order to facilitate easy and quick download of passengers in order to carry them quickly to the next bus hub (Kim Ma station); Opportunity to create a strategic multimodal node by the combination of 3 levels.



Example No2: Hanoi Railway Station

Lines: MRT No 3 / MRT No 1 / Railway service national-provincial-international

Level connection: underground/elevated/on ground

Stakeholders: AFD, ADB, EBI, Systra, HRB, HPC, JICA, VNR…

Comment: Connection being studied by HRB, Systra and JICA; Strategic point in the city which can become an important multimodal hub; Linkage between lines could be done by underpass due to heavy road traffic on Le Duan and Tran Hung Dao.

Example No 3: Nguyen Trai Corridor

Lines: LRT No 3 / BRT

Level connection: elevated/on ground

Stakeholders: World Bank, HPC, HUTDP, Chinese Investor, VNR…

Comment: Overlapping transit lines would lead to a competition between transport means (on 2.4 km). But as the demand is important on this corridor and as BRT should be accomplished before the LRT line, there is still justification of this overlap. P+R can become a real alternative to increase the PT access at the junction with Ring Road No3; Land should be acquired in order to implement parking and to provide an important multimodal degree to this node.

SAMPLE OF PHYSICAL INTEGRATION CHALLENGE

Institutional integration - Public Transport Authority (PTA)

The idea to set up a PTA was launched in 2005 by the HPC and its international transportation advisors. In principle, there is already an agreement between HPC and the DOT; the authorities have in mind that it is necessary to set up such an authority in charge to regulate public transport.

The PTA issue has appeared with the PTS being studied. Though all stakeholders (domestic and foreign) are discussing this issue, it is only the World Bank who until now has managed to implement a project that refers to the creation of a PTA (in the frame of the HUTDP project). Even if other stakeholders as Ile de France experts or AFD are working on this crucial component, only the World Bank provides dedicated budget for PTA settlement. The Bank intends to set up Tramoc as a PTA as, since its creation in 1998, Tramoc has proved its capacity to regulate and manage the bus system and to lead international projects as *Asiatrans* and *Ecotrans* (co-funded by EU between 2005 and 2008).

However, the future PTA's functions and responsibilities, which would be focused on managing and operating all public transport systems, should be carefully assessed. The PTA would be responsible for collecting revenue and managing the fare collection system. The authority will be responsible for awarding and supervising contracts with operators and will elaborate terms of reference in order to maintain a high service quality based on its transport policy objectives. Also, it will have an important role in some PT equipment construction and in promoting public transport.

Nevertheless, as we underlined, many stakeholders are involved in the PTS implementation. Several PMU's and different departments are developing specific and accurate knowledge about metro line construction and operation. At least each one can pretend to become the PTA. However, the main question to answer is to know where the PTA can be settled in the HPC organization chart and what kind of revenue this authority can collect – subsidies from HPC or direct revenue from local tax – in order to become a real "authority".

Operational integration

Until now, the operational integration has actually not been discussed for the whole PTS. The debate is open in some sectors as the operational integration between the current bus network and the BRT project. Issues still to be discussed among the Hanoi DOT in link with World Bank, Ile-de-France and CIM experts include line organization, bus stop location and accessibility, frequency, timetables and operation management.

In the future, between the different means of transport operational integration will show through the technologic options, which had been done now. On the metro lines, a problem of operation and maintenance will appear. As the lines use different technologies (provided by operators and by investors), issues to be focused on are the staff training and administrative capacity building. It is crucial to ensure expertise knowledge transfer from the operators to the local technicians and engineers who will work on the network. The capacity building is also an important issue in terms of training the staff of the future Public Transportation Authorities which has to integrate a specific, yet wide knowledge. The operational integration issue will be underlined at the metro interchange and its management (safety, operation, maintenance).

Before transit line achievement, the operators' efforts should be focused on the training of the staff on the maintenance and operation system, on safety and quality plans, and on economic surveys to ensure an efficient operation. Because of the choice of several technologies, specific staff training would become a real issue. AFD recently addressed this issue, introducing it in their discussion with MPI.

Fare integration

As we mentioned, the basic principle of the integrated fare can be summarized as follows: the ticket price to get into the network should be cheaper than the sum of each line ticket. This allows decreasing transfer line costs. As a result, integrated fare is an asset for the PT network and attracts more passengers. The increase of the number of passengers can increase and improve the service but also the establishment of a new pricing intended for users with low incomes (for example students or unemployed people). However, fare integration is also complex to implement because it requires the implementation of composite mechanisms involving revenue sharing, statistical monitoring of offers provided by different operators, as well as data traffic and revenue.

For its implementation in the Hanoi PTS, two major problems arise. First, integrated fare requires a strong fare policy. Until now, the local authorities, supported by the government, provide low fare bus ticket based on a social consideration (better PT accessibility to the poor people). But the cost of metro tickets will increase due to the goal of profitability that the operators would want to reach, also in order to reimburse loans granted by donors. Second, integrated fare will depend on the ticketing technology. The metro network is developing as an addition of fragmentized lines because of the multiplication of implementation agency and donors/investors. As there are different lines, investors and operators will propose different ticketing systems. A competitive market is being installed. So the question is how to achieve integration. In Seoul, the total fare integration was made possible because bidding was open to *Chaebol* only. In Hanoi the deal is different.

Before realizing a total fare integration, it would be experimented through the BRT project. This line would have a compatible system with the existing bus network.

Image integration

In different cities, the mass transit has become part of a brand image: for instance Kuala Lumpur has got its monorail and Tokyo its Yamamote circle line. Those features were able to not only create a landmark for the city, but also to gain international recognition for their success.

In Hanoi, the local and central authorities are aiming to turn their city into a modern city, one that will be "Green, Cultural, Civilized, Modern" (*Xanh - Văn hiến - Văn minh - Hiện đại*). As Logan (2009) mentioned, the authorities want to show "Hanoi in national and international media as the largest Vietnamese city, the gateway to Vietnam, Vietnam's 'world city'". Developing a brand image for the Public Transportation System can be part of a strategy in order to reach the goal of a modern city. As we know some PT logos are famous all over the world.

Figure 5: London and Paris metro logo (source: www.tfl.gov.uk/home.aspx and www.ratp.fr)

Since Hanoi got its Hoàng Thành - Thăng Long Citadel inscribed in the UNESCO World Heritage List, the number of visitors to the city will certainly increase. PT would become an important Hanoi showroom as it would be used by thousands of tourist every year.

Integrated system are presented here as the *sine qua non* condition in order to reach 55% of urban displacement by public transport in 2030, to improve traffic situation and to ensure to reach sustainable urban transport goals. Despite those objectives, we observed a conflicting approach by the stakeholders and mainly the PMUs who are involved in the construction of the PTS. The PMU's way of functioning questions the term of network integration. In Hanoi, the HRB (PMU for Line 2 and 3) was placed under the direct responsibility of the HPC and detached from the DOT, the authority which traditionally is in charge of the transportation management. Even if this configuration has the advantage of positioning the HRB directly under decision makers, it creates a situation where different modes of public transport are managed by different authorities, therefore placed in a competitive situation. This contradicts the principle of an efficient integrated network.

Besides the issue of coordination between HRB (MRT project), VNR (MRT project) and DOT (in charge of managing the road, bus networks and the BRT project), other factors could threaten the integration of a future network and its operation. Until now, the skeleton of the rapid transit line looks like a collage of various projects proposed by various donors (private, public, bilateral, multilateral, with different objectives and requirements of multiple funding) based on the previous Master Plan. Some experts regret this network was not properly planned based on mobility studies, traffic demand, risk analysis and risk management.

To ensure a smooth integration of the future network and to optimize travel modes in Hanoi, it is clear that the establishment of a PTA, responsible for all modes of travel is required. Tramoc could

eventually undertake this task thanks to their experience on the bus network and its ability to conduct international projects. For this, substantial efforts must be devoted to personnel training, reorganization and clear definition of powers of the future authority, including the operational phase.

Finally, even if the PTS under creation seems to be split up, Vietnamese organizations such as the MOT or the HPC as well as international donors like World Bank, ADB, AFD and JICA, take in consideration the integration issue. This aspect will be debated in the frame of the "aid harmonization seminar" that World Bank and its counterpart organize twice a year. Additionally, each PMU and the donors organize seminars and workshop in order to find applicable solutions for the future.

Conclusion

In Hanoi, the risk of soon becoming a city completely paralyzed by traffic congestion is high. In the first part of this article, we attempted to show that the issue of congestion is not only due to an increase or variation of the number of private vehicles, but also to the type of vehicle including a growing number of cars that consume a greater part of the dedicated transport space within the city. Although beyond the Ring Road No 2, it is still possible to design a city for cars (which is nowadays recognized as the failure of the 1960's urban planning trends), the inner city is saturated and requires a new approach that heavy traffic routes (such as elevated roads) cannot solve. Ultimately, the issue of urban traffic congestion is just one of the numerous difficulties the city is facing and required to solve, while drawing a new concept for sustainable modes of travel.

In the second part we introduced the difference between the concept of sustainable urban transport and its implementation. Sustainability is considered as a concept that can be broken down into a number of targets, namely measures to set up a clear management and organization system. These are requirements that the city cannot comply with yet. The realization of a wide network of public transportation seems to be the panacea that not only solves the current transportation issues, but also improves current environmental conditions. However, the issue of integration exposes the limitation of the current management in charge to develop a public transport network. The failure of integration of a public transport system would lead to a tremendous financial loss that would be attributed to generations of Hanoians who have not even encountered a subway yet, and who will have to pay for the reimbursement of such heavy equipment, in one way or the other, as users or administered through the payment of taxes.

Thus, one might wonder why the implementation of public transport policies and implementation of equipment is taking so long in Hanoi, but we should be reminded that the establishment of a public transport network in a major city usually takes decades. Seoul began to set up the city's network in the 60's and it is still under improvement. New Delhi has begun to take actions for the construction of its subway 30 years ago. Hanoi has signalled its ambition of tackling the implementation of a public transportation system in the early 2000's, by the setup and capacity building of structures responsible for the organization and management of public transport in the city (such as the creation of TRAMOC).

Certainly, issues related to land acquisition and expropriation, coordination of stakeholders, the definition of strategic and qualitative objectives rather than quantitative goals and targets, are all obstacles that stakeholders have to manage in order to build a PTS. Despite the enormous construction costs of urban transport infrastructure, the heading of sustainable urban transport is maintained and Vietnamese officers, engineers and planners are fast to catch up. They are currently facing challenges in order to attain sustainable urban development goals; in this regard, the implementation of an integrated public transport network stands out as an excellent contribution and moreover, it sets the future course for sustainable development in Hanoi.

List of Abbreviations

ADB	Asian Development Bank
AFD	Agence Française de Développement
BRT	Bus Rapid Transit
DoT	Department of Transport
HPC	Hanoi Peoples Committee
HUTDP	Hanoi Urban Transport Development Project
HRB	Hanoi Metropolitan Rail Transport Project Board
JICA	Japan International Cooperation Agency
LRT	Light Rapid Transport
MoT	Ministry of Transport
MPI	Ministry of Planning and Investment
MRT	Mass Rapid Transport
PMU	Project Management Unit
PT	Public Transport
PTA	Public Transport Authority
ODA	Official Development Assistance
TEDI	Transportation Engineering Design Incorporation
TDSI	Transport-Development and Strategy Institute
Tramoc	Transport Management and Operation Centre
PTS	Public Transport System
VNRA	Vietnam Railway Administration
VNR	Vietnam Railway

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