

Metro Express

Envisioning a new public transport system for Mauritius

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Abstract— After several years of discussion and waiting, the present Government of Mauritius has decided to launch the Metro Express—a light rail transport system to better address transport problems for the country in the future. In an island having a traffic ratio of nearly 500,000 vehicles to a population of 1.2 million people, the project comes at a right time to better portray Mauritius with an alternative transport system in the years to come. This research work is more in the form of an opinion article that gives a scientific outlook using econometrics on the project but defends that it should be within the cost parameters of the government and remain a viable means of modern transport in a country aiming to becoming a high-income economy by 2030.

Keywords— Metro Express; transport system; future; econometrics model

I. INTRODUCTION

The Metro Express replaces the former Light Rail Transit concept with merely a change in appellation that was supposed to develop the transport system in the congested urban areas of Mauritius. This project hailed in the 1970s was firstly developed as a concept back in the 1980s when the Government of Mauritius decided to think of a transport system to fight back road congestion. Initially, this idea received a lukewarm response in parliament and the public but only since 1995, the project was further debated under the concept 'Metro Léger' meaning light rail transport system.

It has always been a known fact that a rail system is expensive compared to the traditional bus system. The costs of implementing such a project have varied from Mauritian rupees (MUR 6 billion) in the 1990s to nearly Rs 30 billion recently. The exorbitant cost of implementation has chased successive governments to put aside this mega project. However, alternatives were sought like a busway but this has not been applicable for unforeseen reasons. In the meanwhile, additional lanes have been added to existing motorways along with new roads constructed like the Verdun link road to partly address congestion.

This year, the Government elected since 2014 decided to go ahead with 'grands chantiers'—mega projects and it was well seen that the Light Rail

Transport System (LRT) could be in the limelight for execution in the shortest delay as the wait has been long and unproductive in addressing the transport system.

An initial evaluation was MUR 17 billion that surprised a lot of stakeholders including government elects, economists, politicians, activists and the public in general. The stark decline in value costing from an estimated \$24 billion to \$17 billion was mainly due to the fact that the LRT would not be constructed on pillars but would be based along public roads which significantly lowered the estimate. The source of funding would be mainly from a donation from the Government of India—MUR 10 billion and the remaining MUR 7 billion to be borrowed from local banks. This project will be financed partly by a grant of US 275 million dollars from the Government of India and the remaining financing will be raised either from local financing institutions and/or line of credit from India and/or from Development Partners, on the basis of terms and conditions which are most favourable for the Project [1]. The contract stipulates that if the contractor fails to finish the work on time, penalties will be required per day [2].

The launching ceremony was undertaken on 12th March 2017 symbolising its coincidence with the celebration of the 25th Republic Day in Mauritius. A simulation was done to show the itinerary that the LRT would make in Mauritius namely in the urban corridor between Port Louis, the island's capital city and Curepipe, a major town in the Upper Plaines Wilhems district located some 28 kilometres away. The project is intended to be complete within 4 years' time say 2021 although the Prime Minister of Mauritius conceded that the project might move quite fast.

II. THE TRANSPORT PROBLEM

The transport problem in Mauritius is serious although more and more people use a personal means of transport. In the past thirty years, the number of vehicles in the country has increased by almost 400% making the island one of the densest in terms of traffic management. Since the construction of roads did not progress accordingly albeit some effort to create or extend motorways and build some highways, transport has become a heated issue. There is severe traffic congestion at entrances to Port Louis in the morning and at the exits in the evening, caused mainly by work trips. There is anecdotal

evidence that motorists spend as much as 600 hours annually in traffic congestion [3].

Road congestion is customary due to factors like poor parking amenities, improper parking of vehicles despite traffic signs but, more importantly, as a result of intense traffic on roads particularly in the urban regions.

To develop a better understanding of the theme, the researcher finds it right here to point out that only two districts of Mauritius are urbanised, the remaining seven being inland, coastal and rural districts. The urban areas comprise the six towns of the country namely Port Louis, Beau Bassin, Rose Hill, Quatre Bornes, Vacoas, Phoenix and Curepipe. The railway stations serving the Metro Express are illustrated in Figure 1.

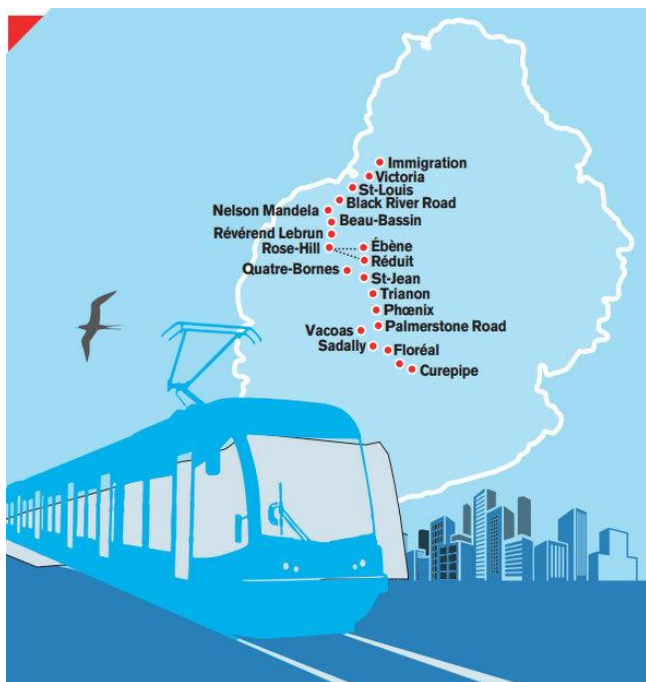


FIGURE 1: Metro Express proposed track in Mauritius – Source L'Express, 19th October 2016 [4]

If the transport problem is not well addressed in Mauritius, the following problems are likely to crop up: longer time wasted in travelling, lowered level of productivity and efficiency and increased level of pollution linked with sound and carbon emissions from vehicles. It was recently reported that traffic congestion made the Mauritian economy lose MUR 20 billion per year. Tick Kan sums up the argument as: What about the current expenses of these 500,000 vehicles, to transport our 1.2 million inhabitants daily? Again, a simple calculation allows us to situate the expenses of gasoline and other consumption of the vehicles to at least Rs 20 billion per year [5].

III. ALTERNATIVE MODES OF TRANSPORT

Alternatives to traffic congestion have been sought in Mauritius as a means of reducing traffic congestion and ensuring quicker connection with the different

places. Below, an indicative list of transport alternatives are provided.

Bus Way

A bus way was initially sought as a means of improving traffic in the urban areas connecting Port Louis and Curepipe. This would comprise special lanes for buses that could move on a special lane where there would be only buses. This measure was considered as an economical and potentially viable one. It did not materialise since there are already built-up places and some residents might have to be located elsewhere. The Bus Way project, which is completely different from Bus Lane, is still one of the government's priorities. This project involves the creation of a lane reserved for buses specially designed on the same route as the light railway, 25 km. The Curepipe to Port Louis route would be at least 35 minutes. Its cost would rise to Rs 4.5 billion against Rs 8 billion for the light railway [6].

Carpooling

This idea was well developed by an earlier government stating that car users could interchange with one another—especially colleagues—on alternate days both as a means of saving fuel but also reducing the number of vehicles on road on alternate days. This technique earned little acceptance from the public as carpooling is not a culturally ingrained practice in Mauritius. Latreille, a spokesman, stated that 'This concept comes from the United States, Canada and Europe. It has grown in Mauritius, especially for the trip to Port Louis and Ebony. People do not hesitate to share a vehicle to save time, save money and be more comfortable [7].'

Special Buses

Special buses known as 'coach' with augmented facilities were tried for executives in the 1990s. From the onset, this practice met with big failure because of the status perception that Mauritian executives had of bus transport.

Special Routes

Special routes were implemented since long with the possibility of providing augmented facilities to the public. This system of 'express route' has met with success. Some companies like Rose Hill Transport, National Transport Corporation and United Bus Service provide new buses equipped with Wi-Fi, air-conditioning, General Positioning System and better seating accommodation through low flat buses.

Light Rail Transit

This has been a much debated issues especially with regards to the operation and implementation costs. With heavy investment amounting to over Rs 17 billion and unexpected additional overheads, this system was contested year in year out but has become an alternative capable of being put to action as from 2017. This system is said to carry up to 80,000 passengers per day with some 30 trams operating on the rail track. It is presently direly supported by the government that wants to go ahead with the project. The LRT is viewed as a road transport system with an integrated three tier structure to provide greater mobility and fluidity in the transport

system for the next 30 years is what the Government envisions, according to Minister Bodha [8].

IV. REASONS TO CONTEST THE METRO EXPRESS

Prior to examining the Metro Express Issue from a technical perspective, it would be important to find out the reasons behind contesting the project. These are briefly described below:

Job loss in the traditional transport system

As soon as the project was initiated by the Government of Mauritius, there were apprehensions from existing transport providers. Trade unions state that there has been little or no communication with bus industry workers. There is nothing stated on job loss in the bus industry while many people advocate that job losses will be imminent in the wake of materialising LRT system in Mauritius. By the way, demonstrations are actually being sought in the country [9].

Non viability of rail transport

Rail transport has not been considered as viable by onlookers. Specialists in this area have contested about the exorbitant price of implementation of rail transport compared to other modes like bus lanes that are cheaper to implement. They have even provided case analyses of countries whereby LRT is a failure.

Long time lag for carrying passengers

Despite the fact that the LRT is going to be a remedy to all the existing transport ills in urban Mauritius, specialists have been considering the time lag in carrying passengers. Given that the proposed Metro Express halts in 19 stations that have been identified, there will be delay regarding time taking for passengers to embark and get down the Metro. Also the 19 halts might be coupled with time for the Metro to move around crossings where existing transport systems pass by.

Difficulty of executing the project

A major problem comes from the implementation of the project. Although, a plan has been developed and possibly, will be put to action in a few months' time, the execution of the project asks for some added questions. For example, when will the project be complete? Will the government have sufficient revenue to finance the project? How long will it take to remove obstacles to the project like already built living structures, old buildings pertaining to patrimony? How much time and effort will be spent on relocation of existing inhabitants whose living plots might be used up by Metro Express [10].

No extension to rural areas

Some onlookers state that the Metro Express will only cater to urban residents and that it overlooks the needs for rural residents who might not be advantages to their urban counterparts. Transport problems in rural Mauritius are also coming along with congested roads, country roads that cannot and have never been altered since more than a century except being consolidated, resurfaced or improved.

Not in line with Mauritian exclusivity

Some pessimists do also state that the Metro Express is not in line with the Mauritian exclusivity of being a

small island nation with its traditional transport system, its 'island-like 'joie de vivre'', its typical landscape and infrastructure. The Metro Express appears to be an imported concept that will be non-viable for Mauritius. Sithanen (2017) comments that It is thus very unclear whether the Light Rail Transport will generate sufficient economic and environmental benefits to offset its large financial deficit [11].

V. REASONS TO SUPPORT THE METRO EXPRESS

From this standpoint, there might be reasons that might otherwise favour supporting the metro Express project. Discordant voices that go against the implementation of the LRT project essentially base their argument on the financial aspect. This has been echoed in the Mauritian press and reached a significantly high level of responses. Despite that, there are comments that favour the development of the LRT in Mauritius and these have lesser to do with the single financial criterion but rather on factors dealing with comfort, convenience, time saving and modernity. A few positive criticisms are synthesised below.

A viable project for Mauritius

Proponents of the Metro Express claim that the LRT project will be viable for Mauritius based from the fact that expenses keep rising year after year and that investment in the purchase of vehicles, repairs and maintenance of roads, construction of new roads, etc. could be detrimental to the finances of the country. A single project linked with traffic decongestion is a suitable alternative to consider.

A long-term strategic solution

The long-term scaling of the project deserves to be mentioned. Very often, transport problems can be addressed by either piecemeal or short-term solutions. Once again, new problems arise. The fact that the Metro Express is long-term oriented with the possibility of expanding through new lines and rural connections could be a well sought alternative for those favouring the LRT.

A safe and non-pollution causing system

This concept has not met with opposition. It is clear that this diesel and fuel-free means of transport focuses on electrical transmission which is pollution free. In a country that focuses on sustainable development through 'Ile Maurice Durable', it is reasonable to say that the LRT has that positive impact of not adding to externalities like air pollution.

A response to safety and comfort

Safety and passenger comfort could be two associated elements in LRT. With a rail track free from congestion, accident rates, if any, could be minimised. There would be higher level of comfort compared to diesel run buses and this is evident from the alignment of railway tracks that causes lesser discomfort compared to bumpy roads, untarred roads and potholes that create discomfort and are also hazardous.

An image of a high income country

The image of public transport could be enhanced with the Metro Express. Generally, this looks like a model

linked with aspiring high-income economies and Mauritius, which aims to become such a model, could well accommodate a modern means of public transport in the middle or long-term.

Job creation in Mauritius

The Prime Minister stated that the Metro Express project is expected to generate net job creation in the transportation sector itself and dismissed any apprehensions about job losses amongst bus employees. He assured that there will be full consultations with stakeholders, particularly bus employees, bus owners and bus companies with a view to coming up with win-win solutions. The PM emphasised that it is estimated that in its construction phase, the Metro Express Project will create around 7,000 full time equivalent jobs and contribute to Rs 13 billion to National Output. "We are expecting even greater economic and social spin-offs, as it will be a safer and environmentally cleaner mode of transportation," said the Prime Minister [12].

VI. A BASIC ECONOMETRIC MODEL FOR THE METRO EXPRESS

From these arguments, the researcher has decided to develop an econometric model so as to better synthesise the concept of the Metro Express in the Mauritian economy. The choice of presenting such a model is useful since it contributes something new to research. Sims describes the econometric model as a model that specifies the statistical relationship that is believed to hold between the various economic quantities pertaining to a particular economic phenomenon under study [13].

So far, most of the arguments have been value judgments made by knowledgeable people, opinion leaders, economists, government and related stakeholders. There needs also be a synthesis of the information in order to be able to better gauge the viability of the Metro Express.

The econometric model, in this particular case, is one that is more linked with a regression model where a few key variables have been associated. In no means does this model perfectly illustrate the situation in Mauritius but this understand and assess the problem.

The key variables here are:

Finance (f)

Finance is the major consideration provided by most experts dealing with the LRT project. The *f* factor is influenced by partial funding of the Indian government (*p*) and expected funding from local banks. This can be written as:

$$f [p + e] \quad (1)$$

Please note that local banks are willing to contribute once the project is on the track, i.e., as from June 2017 onwards.

Time (t)

The time factor is essential as from the announcement and launching of the project. Since the inaugural ceremony on 12th March 2017, there is a proposed time scale given to the project. It is expected to be complete within 4 years. The time factor *t* could be

influenced by extension (*ex*) and delays (*d*) that need to be carefully looked upon. Hence this could be written as:

$$t[ex+d] \quad (2)$$

Infrastructure (i)

A very important component of the LRT remains infrastructure. This is broad in itself but can be synthesised as follows:

Firstly, rail tracks need to be built (*r*) followed by the purchase of trams or LRT vehicles (*v*). Secondly, stations need to be built along with aligning platforms (*s*).

Thirdly, there is the displacement factor where people might have to vacate their existing property and need to be compensated for that. This could be considered as (*dis*).

The infrastructure equation therefore summarises the following:

$$i [r + v + s + dis] \quad (3)$$

Overheads (o)

Overheads could be generalised as any added cost linked with all the factors identified here namely finance (*f*), time (*t*) and infrastructure (*i*). Sithanen (2017) posits that 'We have to be very vigilant, especially as one common pitfall is the tendency to underestimate time and costs, and to be wildly optimistic on forecasts of future passenger demand and other revenues during the decision making process. Many studies of new ME systems in developing countries show that costs have been well above and ridership well below forecasts made when the projects were approved [14].'

Government (g)

The researcher would also include government as the main supporter of the project under the supervision of the Ministry of Public Infrastructure, the existing governing party, the Prime Minister of Mauritius as the patron of the project. Without government support (*g*), this project might not even have been announced. Hence (*g*) is a significant factor because in case if another government comes, the project might be repealed or changed into some other type of transport activity.

Errors (θ)

The theta symbol summarises errors that exist in the econometric model. Errors could be numerous arising from the non-inclusion of a significant variable, increased time delays, increased overheads, change in government philosophy, etc. The inclusion of errors could mainly respond to the non-exhaustive nature of the variables that influence the synthesis of the LRT concept. This also removes the responsibility of subjectivity and unexplained error in the model formulation.

VII. THE SUMMATION OF THE ECONOMETRIC MODEL

The model could be interpreted as follows:

The Metro Express Light rail transit (M_{LRT}) depends on the alignment of the following econometric model based on a simplistic regression equation. For each variable the influence of a Beta value (β) is

considered. This value adds weight to the regression equation.

To sum up:

$$M_{LRT} = \sum \beta_1 (f [p+e]) + \beta_2 (t[ex+d]) + \beta_3 (i[r+v+s+dis]) + \beta_4 (o) + \beta_5 (g) + (\theta) \quad (4)$$

Note: All the Beta values could be formulated in figures but not, at the present time, because financial figures and outcomes have not yet been presented.

A simulated model of Beta values:

β_1 could be the highest value because finance is the key variable of the project. It has to be rigorously controlled and see that it does not influence β_4 which should be a lower value.

β_2 should be lower than β_1 because time delays and extensions should be aligned with the budget parameters.

β_3 should normally be a high value as infrastructure, vehicles or trams needed, stations and displacement are central to the running of the project. It should be close to β_1 .

Other Beta values (β_4 and β_5) must be lower than the rest. Care is taken in the theta value that should be low and within control parameters.

VIII. VALIDITY OF THE ECONOMETRIC MODEL FOR THE METRO EXPRESS

This econometric simulation of the LRT model for Mauritius is based from novel interpretation of information. Too often, a project can be criticised by using value and subjective judgments; some being unfounded and some other having a biased political connotation. It would be wrongful to see a bland statement as 'putting stick to the wheel' to contradict the project.

The researcher has been, as any common Mauritian citizen, a user of road transport for years and an onlooker of societal problems and challenges in his country. Using a simulated econometric model states how the different variables interact and how if, all these are well controlled, might give an indication of the viability of the Metro Express in Mauritius. It is also concluded that although metro systems are the most expensive urban public transport option, their high capacity and best performance (in terms of speed and number of passengers conveyed, make them invaluable parts of highly developed transport systems [15]. He also suggests that the coming of the railway system in a modern way back from a long-term successful spin in the last century, means a lot in terms of the economic progress of Mauritius under its vision 2030.

IX. CONCLUSIVE COMMENT

This research article has contributed in an innovative way to the Metro Express concept to be developed in Mauritius. It has summarised the pros and the cons of

the project but states in an econometric model the key considerations that the project should undertake. It is more a scientific contribution to the debate and complements both apprehensions and expectations from a much-awaited future development of transport in the island of Mauritius.

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