# The Real Cost of Highway Development- Who has got the numbers right?


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The article is written to provide a professional insight to the continuing debate on the cost and benefit of highway development in Sri Lanka. The allegation and the defense both seem to be misleading the public on the actual facts. Since this issue has become the focus of political and public discussion today, I have decided to share with the public to the best of the information that is available to me, the results of a rigorous analysis of road construction costs in recent years.

This analysis is based on three approaches. First it compares costs of local road projects internationally for similar constructions especially in other developing and in particular Asian countries. Secondly it compares the increase in costs for similar projects in Sri Lanka over time and thirdly it compares between different types of contracts awards- especially focusing on a new strategy of dispensing with competitive bidding. This analysis has arrived at the following conclusions:

- The strategy of developing highways in a post war economy is judicious and timely. Sri Lanka had fallen behind in not having a modern transport network and the choice of rapid road development as a catalyst to economic development has to be commended.
- Highways when properly planned should deliver benefits much greater than the cost of construction. This is how highways contribute towards economic growth.
- Incurring a higher cost for construction of a highway and/or poor planning that leads to inadequate benefits will however make a highway a burden to the economy.
- It is found that the cost of constructing a km of expressway has increased 2-3 folds over a period of 5-6 years. This is far higher than the rate of inflation for road construction.
- The cost of constructing roads in 2005 appears to match global norms while in most instances the current costs for foreign funded projects are also comparable to global rates. Thus not all roads projects can be considered as being over-priced.
- An exception to above is where road construction contracts are awarded without competitive bidding (tenders). In this case it has been mathematically proven that contract costs are higher by 55%.
- Award of contracts without competitive bidding has reached a peak in 2014 with projects reportedly worth Rs 333 billion awarded over the last 12 months alone. In these projects costs are higher by around 135%. The loss arising from this alone is estimated at Rs 200.5 billion.
- It is also noteworthy that all these projects have been funded with Chinese sources and awarded to Chinese contractors. Moreover, this approach is spreading with contracts worth Rs 110

billion funded with borrowings from local banks also awarded on the same basis this year to local contractors.

The discussion and basis of reaching the above conclusions is given below.

## Why Road Building is important?

It is irrefutable that roads are important for development. Modern economies are built on reliable and fast connections between ports, airports, cities and different industries. Convenient personal transport is also becoming an important feature of social contentment. Easy access to work and school, as well as to hospitals, shops, to visit relatives and friends and for recreation are important quality of life features. Sri Lanka has followed many other countries by prioritizing road development as a foundation for economic prosperity.

However road development is a double edged sword. While the correct road connecting the right places will bring multiple economic and social dividends, a poorly planned and/or poorly designed, or poorly constructed road or one that cost hugely more is likely to become an economic burden. Thus instead of benefiting road users, such projects become a financial burden requiring loan repayment and upkeep over many years, for an infrastructure that has little or no direct benefit to people or the country.

## Why Examining Road Construction Cost is Important?

There are many examples from around the world where roads, expressways, interchanges, bridges, tunnels etc constructed without due feasibility study, or planning are now wasting away without adequate traffic and sometimes even found to have been abandoned. In some cases they carry only traffic that has diverted from another road. There are too many 'failed' road projects the world over for anyone to assume that any road even if its carries a full load of traffic is an economic success. Success or failure can be judged on the basis of the scale of cost of the investment to its return and also on the equity principle if people who bore the cost are the ones getting the benefits.

These types of mistakes often stem from a preoccupation with building 'instant' roads and a blatant disregard for accepted processes of highway construction backed by scientific planning, evaluation, design and procurement management.

## History of Lanka's Expressways

The first concept for this was mooted just after the 1988-89 JVP uprising by then President Ranasinghe Premadasa who proposed an 'alternate trunk road network' to develop the country's hinterland areas. The pre-feasibility studies for several of these highways were done in the early 1990s. However it was left to the subsequent Government of President Kumaratunga to move this forward. ADB financing was approved for one section of the Southern Highway in November 1999 and the RDA started clearing work thereafter. Approval of funding from Japan's JBIC was also obtained in March 2001 for the balance section. However in August 2001 a group of 49 villagers filed a petition in the Appeal Court seeking reasonable compensation. This action delayed the project till a new compensation system was developed and the project was allowed to proceed only in 2005 with one part as four lane and the balance as a two lane highway. The initial cost estimate for the 126 km from Kottawa to Matara was US Dollars (USD) 349 million, at a unit cost of USD 2.8 million per km. The Government of President

Mahinda Rajapaksha, had the highway re-designed as a fully four lane expressway of 96 km up to Galle and had it completed in 2011 at a cost of USD 741 million or USD 7.7 million per km, the increase being partly due to the redesign and in some cases re-construction. The subsequent section up to Matara – a length of 35 km was completed in 2014 at a cost of 180 million USD or 5.1 million USD per km. Similarly, an expressway to the Katunayake airport was planned in the late 1980s and the current road trace finalized in the late 1990s but not implemented due to the inability to obtain favourable financing terms. The construction of the Katunayake Expressway started with funding from China in 2009. The planning for the Outer Circular Road also dates back to the 1990s for which funding from Japan was secured in 2007. Since then the current government has accelerated the expressway construction program having completed a total of 167 km with a further 101 km under construction a commendable progress to date.

## Has Sri Lanka the largest investment for road construction for a country having an economy of its size?

The reported cost of Sri Lanka's expressway program to date is as follows:

| Cost of Construction of Expressways in Sri Lanka (mn USD) | | | | | |
|---|---|---|---|---|---|
| | | Period | km | USD mn | USD mn per km |
| **Southern Expressway** | Kottawa-K'gahahetekma (Japan/JBIC) | 2001/11 | 67 | 463 | 7 |
| | K'gahhetekma - Pinnaduwa (ADB) | 2000/11 | 29 | 277 | 9 |
| | Pinnaduwa- Godagama (China/Exim) | 2011/2014 | 35 | 152 | 4 |
| | *Godagama-Beliatte (China/Exim)* | *2014/* | *30* | *795* | *26* |
| **Katunayake Expressway** | Peliyagoda-Katunayake | 2009/13 | 26 | 385 | 15 |
| **Outer Circular Highway** | Kottawa-Kaduwela (JICA) | 2009/14 | 11 | 212 | 19 |
| | *Kaduwela- Kadawatha (JICA)* | *2012/15* | *9* | *379* | *43* |
| | *Kadawatha- Kerawelapitiya (China)* | *2013/* | *9* | *666* | *72* |
| **Northern Expressway** | *Stage 1 Enderamulla-Ambepussa* | *2014/* | *53* | *1000* | *19* |
| **TOTAL Completed** | | | **168** | **1488.5** | |
| ***TOTAL Under Construction*** | | | **101** | **2840.0** | |

It is clear that per km cost of the expressway program has steeply increased from 7 million USD for the Southern Expressway financed by Japan/ADB to 72 million USD per km for a recently awarded project for a section of the Outer Circular Highway awarded to the Metallurgical Corporation of China. Many have compared this and erroneously concluded it to be a 10-fold increase in cost. With the section from Matara to Beliatte and Stage 1 of the Northern Expressway awarded most recently, the total investment would reach 4,328 million USD, possibly the largest investments in the world for road construction for a country having a similar economy. This underlines the government's commitment to continuing with road construction as a primary backbone of development- possibly even at the risk of neglecting other sectors.

## Comparing Road Construction Cost – Sorting Oranges from the Apples!

The comparison of per km cost can be misleading and should be done carefully. No two roads or the conditions where and when those roads are built will be identical. In order to understand these variations the World Bank commissioned a study of over 430 road projects from 65 developing countries including Sri Lanka. A more recent study by the University of Oxford using cost from 3,000 road construction projects from 99 developing countries has also been concluded. Both studies found that

construction costs vary with the terrain, soil and climatic conditions, design standards, construction type, type and number of structures, labour and material costs, land costs etc. While it is not possible to discuss the details of each of these, the averages that were arrived in these two studies are reproduced below:

| Average Global Road Construction Cost (mn USD per km) in Developing Countries | | | | |
|---|---|---|---|---|
| | World Bank | | University of Oxford | |
| | Medium | High | Medium | High |
| New Expressway 4 lane | | | 2.8 | 7.8 |
| New Highway 4 lane | 2.8 | 4.0 | 2.2 | 4.6 |
| New Highway 2 lane | 1.3 | 1.9 | 0.8 | 2.0 |
| New Road 1 lane | 0.9 | 1.2 | 0.1 | 0.2 |

It is noted that even the 'high' averages of the global expressway construction costs, are significantly lower than the costs in Sri Lanka. Construction costs can sometime become 'high' as they are heavily influenced by the frequency and type of interchanges and other structures, especially tunneling. Even allowing for such variations, and allowing for inflation in material and fuel costs, the Katunayake Expressway at 15 million USD per km, the Outer Circular Highway at 19 to 72million USD per km (based on RDA estimate of Rs 86.6 billion for OCH Phase 3) and the proposed Northern Expressway at 19 million USD, appears to be 2-3 times higher when compared to the construction cost of a 4-lane expressway obtained in a range of developing countries which at current global prices should be between USD 7-10 million/km. The extension of the Southern Highway to Beliatta at Rs 26 million USD per km confirms this. More alarming is the difference between the recently concluded Galle-Matara section and the recently awarded extension to Beliatte where the difference is 6-7 times!

## Is this due to Cost Escalation?

The inflation of cost for expressway construction measured for the USA for the last 10 years has been 10%. In Australia the index adjusted to USD is around 20% while in most EU countries the construction index rose by just 2-3% . In India, the index between 2007 and 2014, when adjusted for exchange rate variations was found to be nearly constant. The road construction cost index published by ICTAD in Sri Lanka rose from 240 points in the year 2004 to double that in 2013. But when adjusted for the foreign exchange variation, the cost increase in USD reduces to just above 50%. Hence the most reasonable estimate for non-urban expressway construction in Sri Lanka should average around 7-10 million USD per km, and at most another 50% for more difficult soil conditions and frequent structures and interchanges. Thus claims that all expressways in Sri Lanka cost 5 to 10 times more are very difficult to substantiate. However, they are significantly higher than what they should be. Such an escalation in construction cost cannot be explained by price inflation or design alone.

## Why Higher Costs?

There are three possible arguments to try to explain this gap. The first is that Sri Lanka is now moving to a middle income country and thus construction costs are rapidly increasing compared to other developing countries. In fact figures from several developed countries shown below confirms this .

| Construction Cost of 4 Lane Expressways (mn USD per km) in Developed Countries | | | |
|---|---|---|---|
| Country | Urban | Rural | Mixed |
| Norway - 4 lanes | | | 8.1 |
| Poland - 4 lanes | 34 | 9 | |
| Oman - 8 lanes | | | 10 |
| USA/Canada - 4-8 lane | 24 | 5 | |

There is also evidence that expressway construction in urban areas, costs around 4 to 5 times more than in rural areas, while mountainous terrains, tunneling and bridges also shoot up the costs for individual projects. However the expressway construction contracts awarded over the last 12 months in Sri Lanka ranging from 19 to 72 million USD per km appears to be in a cost class of its own raising questions about the economic viability of new expressway projects in Sri Lanka. In order to try to better understand this phenomenon we can compare with some Asian countries as shown below:

| Construction Cost of Expressway Projects in Asia (mn USD per km) | | | | | |
|---|---|---|---|---|---|
| Country | Expressway | Year Completed or Planned | kms | Cost mn USD | km cost mn USD |
| India | Mumbai-Pune (6 lane) | 2002 | 93 | 190 | 2.0 |
| | Ahmedabad Vadodara | 2004 | 91 | 110 | 1.2 |
| | Jaipur-Kishangarh (6 lanes) | 2005 | 90 | 118 | 1.3 |
| | Ambala Chandigarh | 2009 | 35 | 55 | 1.6 |
| | Mumbai to Nashik ( 6 lanes) | 2011 | 150 | 728 | 4.9 |
| | Mumbai to Vadodra | planned | 380 | 1100 | 2.9 |
| | ***Average/Total (India)*** | | ***839*** | ***2301*** | ***2.7*** |
| Pakistan | M3 Pindi Faisalabad (6 lanes) | 2004 | 52 | 56 | 1.1 |
| | M1 Islamabad Peshwar y (6 lanes) | 2007 | 154 | 117 | 0.8 |
| | Hazra (6 lanes) | 2017 | 60 | 326 | 5.4 |
| Malaysia | North South Highway (4- 6 lanes) | 1996 | 772 | 1716 | 2.2 |
| Vietnam | North South Highway | Planned | 1941 | 18,500 | 9.5 |
| China | Shenyang-Dalian Expressway | 1990 | 348 | 512 | 1.5 |
| | Gunagshen Expressway (6 lanes) | 1997 | 123 | 1340 | 10.9 |
| | Mianyang and Guangyuan | 2004 | 130 | 790 | 6.1 |
| | Guanzhou-Gaoming (6 lanes) | 2007 | 130 | 450 | 3.5 |
| | Zunyi-Maotai expressway | 2010 | 45 | 324 | 7.2 |
| | Mengzi-Xinjie expressway | 2010 | 85 | 815 | 9.6 |
| | ***Average/Total (China)*** | | ***861*** | ***4231*** | ***4.9*** |

This shows that our neighboring country, India has one of the lowest expressway construction costs in the world. However, our own costs for 2013/14 projects are double that of Vietnam, quadruple that of Pakistan and are generally 5-10 times more expensive than India. In India land acquisition costs and construction material as well as labour are less expensive and this can be partly the reason. There should however be other reasons to account for this difference.

Short sections of urban expressways where tunneling and other complex structure are required can cost several hundred USD per km. Japanese expressways cost over 200 million USD per km on account of very special conditions in that country – mountainous terrain, high seismic activity and exorbitant land acquisition costs. The section of the Outer Circular Highway between Kadawatha and Kerawelapitiya at

USD 72 million per km comes close to being the world's costliest suburban expressway outside of Japan, known to the author.

There are a number of possible reasons for higher expressway construction costs in any country. These would be (a) poor planning, (b) poor design, (c) poor estimation and cost control, (d) poor or non-existent competitive procurement processes, (e) lender-nominated contractors and (f) corruption.

## Where are the Feasibility Studies?

Poor planning results in expensive changes to schedules, traces, relocations of interchanges and other critical control points of a road. But good planning takes time. The hurry demonstrated by the Government and the RDA for initiating and awarding the recent most contracts appears to have been a costly mistake. These feasibility studies and public discussions have remained known to only a few selected people and senior officers of the RDA are still unable to even provide basic details of these recent projects. The exclusion of national transport and highway experts in the planning process of this multi billion rupee investment must surely be for a reason. In previous expressways the feasibility studied were done by both foreign consultants and local institutions such as the University of Moratuwa. Such checks and balances are essential and a possible reason why earlier expressway were constructed for globally comparable costs. Poor scheduling of projects by starting many road construction projects simultaneously can increase resource costs created by short term shortages.

## Cost of Corruption

The most alarming reason for high cost is the possibility of corruption. Both the World Bank and University of Oxford Study referred to earlier found that corruption levels in a country as measured by the Transparency International Index and the World Governance Indicators increased road construction costs. It concluded that countries with corruption levels above average have about 12% higher for bank funded projects costs and that corruption and collusive practices was even higher for projects undertaken directly by governments without the need to comply with international procurement procedures.

## Is it only Expressway Construction that is expensive?

Apart from expenditure on the expressway program, Sri Lankan road network has seen rapid expansion and improvement at national, provincial and even rural levels. This accelerated development program has improved motorability of many trunk roads. However, travel speeds have not improved due to increasing vehicle imports and deteriorating public transport and road safety still remains a critical issue. Nevertheless this development holds great potential for integrating production and consumption areas through transport nodes such as the ports and airports. These are vital for sustainable economic development.

However, the expenditure on road rehabilitation too is being questioned in recent times. Given that the investment on road reconstruction was well below par for several decades, the high expenditure is justified if these roads will result in the envisaged benefits. However if we have indeed spent more than is warranted on a road, it becomes that much more difficult to make it economically viable. A multiplicity of such roads can bankrupt an economy.

Even though existing roads have also been improved in recent years giving an impression of the beginning of a long awaited development of the country, the investments on these roads has to earn its economic value over the life of the asset. International funding agencies and banks are happy to lend and it should be the borrower's responsibility to ensure that borrowings are economically productive. If such benefits are not forthcoming in the immediate years, there is a possibility that such infrastructure was built prematurely and would deteriorate before adequate benefits are reaped. Scarce public funds and loans tied up in such unproductive projects could deprive other sectors of investment and could risk future economic progress with heavy loan repayments.

## Analysis of the Cost of Reconstructing Existing Roads

This study has also completed the detailed analysis of 22 national road development programs that were inaugurated from 2011 to date, worth a total of Rs 406 billion, financed with external and internal borrowings by a host of agencies including the ADB, World Bank, JICA, Saudi Arabia, Kuwait, France, Korea and China. It also includes borrowing from foreign and local commercial banks. The majority of funding has been for road rehabilitation and improvement. This also includes a variety of roads ranging from 2- lane national roads in mostly rural flat terrain costing USD 0.5 million per km to multi lane roads in urban areas that cost over USD 2 million per km. The analysis shows that in general, the cost varies with road width, terrain and traffic conditions. It is also affected by acquisition and inclusion of structures such as bridges.

A comparison of 2 lane projects in similar flat terrain carrying low to moderate traffic is shown below. This shows that the four projects funded by China Development Bank (CDB) to be ranging from 20% to at least 80% higher than comparative projects funded by the ADB. Moreover there is a further sharp increase in costs, especially for the CDB projects, commencing in 2014, when compared to those that commenced in 2011.

**Cost for Reconstruction of 2 lane National Highways (non urban) in Sri Lanka (mn USD per km)**

| Funding Institution | Program | No of Road Projects | Period | kms | Cost LKR (mn) | Cost per km (LKR mn) | Cost per km (USD mn) | Province |
|---|---|---|---|---|---|---|---|---|
| ADB | CAREP (Comp A Part 3 | 2 | 2011/14 | 66 | 4,392 | 66.5 | 0.5 | NCP/NP |
| ADB | NRCP | 11 | 2011/14 | 174 | 12,187 | 69.9 | 0.5 | NCP/NP |
| ADB | NRCP (Additional) | 9 | 2013/15 | 118 | 9,495 | 80.8 | 0.6 | NCP/NP |
| China Dev Bank | PRP1 | 6 | 2011/14 | 179 | 14,615 | 81.6 | 0.6 | SP/WP/EP |
| China Dev Bank | PRP2 | 8 | 2011/14 | 191 | 18,156 | 95.0 | 0.7 | SP/WP/EP |
| China Dev Bank | PRP2 (Nothern) | 11 | 2011/14 | 408 | 37,517 | 91.9 | 0.7 | WP/Uva/EP/Central |
| China Dev Bank | PRP 3 Phase 2 | 9 | 2014/ | 93 | 13,078 | 140.7 | 1.1 | SP |

## Haste makes Waste! The impact of Negotiated Contracts

Non adherence to established engineering costing and procurement processes can also contribute to higher costs. An even more detailed and rigorous analysis was performed on another 93 individual road projects awarded between 2005 and 2010 again using borrowings. This showed that the best estimate of the cost of rehabilitating a two lane national road in 2005 was Rs 47.5 million per km. This compares well the international average of 0.2 to 0.7 million USD per km for varying degrees of road widening required. This has increased to Rs 72 million in 2010 which perfectly matches the recorded changes in the ICTAD road construction index over the same period. Project costs were tested statistically against

different funding agencies and the only variation that was established was for the 8 projects financed by China and awarded without competitive bidding to 5 selected Chinese contractors for an amount of Rs 63 billion rupees. In this case the cost per km was found to be an outlier at 55% above the rate of all other projects funded by all other agencies. These were also the only projects that did not have competitive bidding.

A trend is observed of preferring road construction projects to be awarded on non-competitive bids. From information available, all expressway contracts awarded over the last couple of years as well as an number of road reconstruction projects were awarded without competitive bids (tenders). Based on mathematical inference, there is clear forensic evidence that such projects were 55% costlier than those that were bid competitively in 2011. However, the same statistical testing shows that this increases to an average of 135% by 2014. For example the Kadawatha-Kerawalapitya section is estimated to be over priced by at least 68%, while the Northern Highway which was launched last month appears to be over priced by 126%. The extension of the Southern Highway from Matara to Beliatta however appears to be in a class of its own is over priced by an astounding 545%. The common denominator of all these projects is that they were funded with Chinese borrowings and contracts have all been awarded in 2014 without calling for competitive bids. The loss arising from these 4 projects alone is estimated at Rs 200 billion.

**Estimated Loss from award of Road Contracts without Competitive Bidding**

| | | kms | Rs mn | Estimated Over pricing % | Estimated Loss Rs bn |
|---|---|---|---|---|---|
| Rehabilitation & Improvement | PRP 3 Phase 2 | 92.9 | 13,078 | 55 | 4,641 |
| Outer Circular Expressway | Kadawatha- Kerawelapitiya (China) | 9.3 | 86,600 | 68 | 35,052 |
| Northern Expressway | Enderamulla-Ambepussa (China) | 52.8 | 130,000 | 126 | 72,478 |
| Southern Expressway | Matara-Beliatta (China) | 30.0 | 103,300 | 545 | 88,329 |
| **Total 4 projects** | | **185.0** | **332,978** | | **200,500** |

## Conclusion

While we all like to travel on new roads, we need to remember that there is a cost for using them. The story of what happened to thousands of kilometers of rural roads constructed in Sri Lanka in the years after independence in a bid to secure rural road connectivity needs to be retold. Even though many of these were paved on election promises, these roads still have little traffic, as no economic growth has followed. Consequently, in most cases, these roads have fallen into poor state of repair due to financial inability of local governments to maintain them. Thus investment in roads does not always lead to prosperity. It can even end up to a spiraling down of economic potential if economic benefits that are required to pay off the loans are not forthcoming. This is why it is the usual procedure for feasibility studies to be carried out prior to investing in roads or any other investment. Many countries table such feasibility studies for public study and comment. The best local experts and often foreign experts are used as advisors. The cost of the investment should be proportionate to the scale of economic returns and traffic volumes on a road. Building oversized infrastructure ties up scarce national resources in underutilized assets and eventually imposes an increasing financial burden to operate and maintain. Wide empty roads that motorists like to speed on could actually be a symptom of poor judgment and reckless expenditure and not necessarily a sign of visionary development. It is thus easy for a well

intended road building program to become an end in itself or worse still a means of massing personal wealth for a corrupt few.

## Recommendations

The following recommendations are made with respect to future investments in the road sector:

1. Stop forthwith the practice of awarding contracts on negotiated terms. Return to competitive bidding which is the regular process adopted in all societies and governments valuing transparency in business dealings. There is sufficient evidence to show that negotiated road contracts in the last 12 months alone have cost the country over 200 billion rupees.
2. Conduct proper feasibility studies using both local and foreign experts/institutions. There is evidence that the lack of checks and balances and the restriction of access to information on road projects is most likely being used for corrupt practices.
3. To seek private funding at least in part for road projects that have revenue potential as is the case in most countries. This will release more public funds for education, health and other urgent social investments. Such private public partnerships will curb wide spread overspending as has been observed in some road projects.
4. To develop an integrated Masterplan that would enable benefits from these roads to reach the masses and not just the car owning and tour-loving public.