Road Planners should not Look Just Right and Left But Rather Should Also Look Up

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ABSTRACT

There are a number of transportation authorities in several countries that employ double decker roads or even multi decker roads in order to ease the traffic congestions they have. On the other hand, there are some countries that do not employ double decker roads at all without any good rationalization like Israel, Kuwait, Turkey, Greece, Croatia, Bulgaria, Romania, Serbia and many more.
The main concept of this chapter is that transportation authorities of small countries with small areas that can be dedicated for roads, should not look just right and left, but rather should also look up in road planning. This concept should be maintained by road planners not just in small countries, but also in small areas with a dense population.

MAIN FOCUS OF THE CHAPTER

When a road becomes congested, there is a need to widen the road and to add new lanes; however, some obstacles can get in the way. Sometimes there are buildings in close proximity to the road which leave no area to construct additional lanes. In Some other cases the terrain nearby the road is unpavable.
The alternative option for widening the road is constructing one or more road decks above the current road. There are several transportation authorities in the world that already put into service double decker roads or even multi decker roads with the aim of alleviating the traffic jams and congestions they have in their territories. For example the city of Seattle in Washington, USA is a large city of more than 4 million residents. Yet, Seattle is located amid many water bodies like inlets of the Pacific Ocean, lakes and streams which make the city dense and challenge the capability of widening the roads. So a main section of the main highway of Seattle (I-5) is a double decker road with the aim of coping with the intense traffic of Seattle [1].
There are also double decker roadways in the USA in other places such as Austin, Texas and Chicago Illinois [2]. In Chicago there are even some triple decker roads. In addition, there are double decker roads in other countries in the world e.g. in Kobe, Japan, in Seoul, South Korea, in Manila, The Philippines, in Teheran, Iran and in many more places.
Nowadays, the construction of double decker roads is not a policy of only developed countries. As was mentioned above non-developed countries like The Philippines and Iran also construct double decker roadways.
There is a known debate over the expansion of road infrastructure and about "Induced demand". Induced demand is a controversial term arguing that every new road will be quickly filled up with new traffic. I.e.

there will always be a flood of new drivers that will use the new road as soon as the new road is open, immediately jamming the road over again. This theory is regularly used as a reason why expansion of road infrastructure will not alleviate traffic congestions.
The Induced demand concept is debatable [3]. Anyway, it is unquestionable that there is a minimum of roads that should be paved and when there is a clear need for a road expansion double decker roads should be considered as we will explain in this chapter.
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Another issue that should be taken into account when considering road expansion is the emerging technology of autonomous vehicles. Investing in road expansion can be open to discussion if the road capacity is going to be substantially expanded by the usage of autonomous vehicles.
Autonomous vehicles are self-guided vehicles that can maneuver and prevail over driving difficulties without any human driver assistance by employing a number of dedicated devices [4]. These devices will provide the autonomous vehicles the ability of monitoring their surroundings and coming to a decision in real time how to handle each situation. Currently, the autonomous vehicles are anticipated to go on the roads we are now familiar with and also with the same traffic signs.
The road capacity and flow rate in the roads will significantly be improved by the autonomous vehicles mainly because of two attributes:
1. Shorter safety distance between vehicles.
2. The variance between the velocities of the vehicles will be much smaller.
The obvious question is why investing in double decker roads when the road capacity is going to be considerably extended? In [5] the author summarizes autonomous vehicles implementation previsions. There are few optimistic companies that believe they can offer a full autonomous vehicle environment in the near future; however, most of the companies agree that it will take a long time to offer a full autonomous vehicle environment. Few of them even predict the full autonomous vehicle environment will be available just in 2070-2080. It is unforeseeable which prediction is correct because numerous and various factors are involved in the development and several other unexpected circumstances can arise as well [6]; therefore we cannot wait for the autonomous vehicle technology to be mature enough and we have to solve the congestion problem in the near future.

Considering all the subjects discussed above, we should look at the results in other locations in the world that double decker roads have been implemented with the aim of realizing what the potential gain of a double decker road is:
In Tokyo, Japan there is a double decker expressway between Itabashi junction and Kumanocho junction which crosses the Central Circular route (C2) and route no. 5. The double decker road was built because of intense traffic congestions and indeed it succeeded in reducing the travel time from 66 minutes to 41 minutes [7].
Another successful double decker road has been implemented in The Philippines. This double decker road of 18-kilometer called "Skyway 3" was opened in 2021. The road links Southern Luzon Expressway (SLEX) to Northern Luzon Expressway (NLEX). The project was a great achievement as it succeeded in reducing the travel time from SLEX to NLEX from 3 hours to only 20 minutes [8].
Additional instance of double decker road's success is The Santa Cruz–Chembur Link Road in India connecting the Western Express Highway (WEH) in Santa Cruz with the Eastern Express Highway (EEH) in Chembur. The road effect appeared to be substantial as the travel time was reduced from 50 minutes to 20 minutes [9].

Even though double decker roads are usually more expensive to build than conventional roads, there are several reasons why this kind of road has been chosen in more than a few locations:
1. Double decker roads are safer – the likelihood of finding pedestrians or wildlife in the upper level is significantly lower.
2. The acquisition and demolition costs of the nearby structures can be higher than the extra budget needed for building an upper level.

3. If the terrain is hilly, it can sometimes be very expensive to level or carve a path through the hills. Concisely, the governments of small countries with small areas that can be dedicated for roads should consider road expansion differently. Instead of looking just right and left, they should also look up.
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- **References**

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