

Highway & Expressway: Kathmandu Terai Fast Track & Its Multidimensional Impact in Shaping the Future of Nepal

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Abstract

Kathmandu Terai Fast Track is prioritized as a national pride project, constructed by the Nepal army. It is supposed to revolutionize transportation in the country. The KTFT Expressway plays a vital role in the state-building process, particularly by reducing travel time and quality of road communication to the provincial capitals. The project can accelerate the country's economic growth, improve trade links, provide greater market access to the industry, and connect southern states to the capital of the country. The project has a new approach to constructing roads, tunnels, and tall sophisticated bridges that allows technocrats to sharpen their knowledge and improve their skill. The project is marked as the game changer for the Nepalese economy. The article through the research methodology tries to incorporate the multidimensional impacts that the expressway will have in shaping the future of Nepal.

Keywords: expressway, ADT (Annual Daily traffic), BRI (Belt and Road Initiative), geopolitics, NA, KTFT.

INTRODUCTION

Both the highways and expressways are physical units of transportation systems that allow traffic flow, they are slightly different. Expressways can be defined as continuous ways that do not have grade crossings which is specially designed for high-speed traffic consisting of two or more lanes and having traffic from both directions separated by median strips and have advanced design, eliminating steep gradients and inconvenience, ensuring short travel time. Expressways has a direct or indirect long lasting impact on the economy of the nation. Expressways are the highest class of road which includes limited entry and exit points, allowing vehicles to travel at high speed ensuring less risk of incurring accidents whereas in the case of highways there are multiple crossing and merging of different routes at many places which eventually increases the traffic congestion and risk of accidents.

Expressway Vs Highway?

Highways are generally used to connect two or more important cities. It provides both mobility and accessibility to traffic up to a certain limit and almost all the types of vehicles can travel on it. They

are generally of 2 to 4 lanes with allowable speed limited to 60-100kmph.

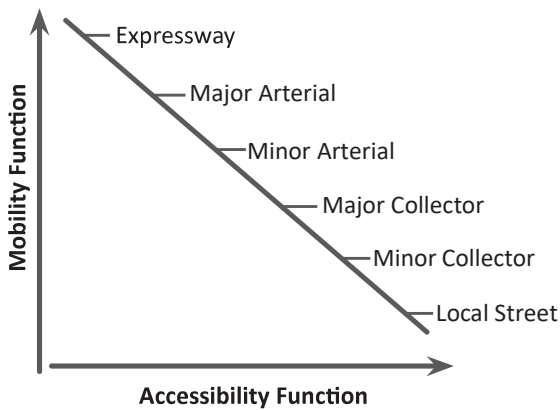
Expressways are generally designed for mobility but provide less accessibility. They are generally used to connect important trade links ensuring very short travel time, accelerating economic activities, and fostering economic growth. Studies have shown that expressways connecting to urban centers are safer for traveling and can contribute to reducing accidental injuries (Egan, Petticrew, Ogilvie, and Hamilton, 2003, p. 1463) that is because of the high standard design and separate lane allocations for high-speed long-distance vehicles and others.

The history of the development of roads in Nepal goes really back but the major development initiated during the era of King Mahendra who built the East-West highway (Mahendra Highway) of 1027.67 kilometers linking 22 districts of Terai region to foster economic development and improved the

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connectivity of Kathmandu with Terai through Kanti Rajpath and Tribhuvan Highway (159.66 km), similarly Kathmandu Pokhara Highway, Arniko Highway (112.83km) to increase the connectivity. These highways connect to the city northeast of China and east-south, middle-south, and west-south to India (Bhat, 2021, p. 4).

The only route connecting the Terai with the capital before the construction of the Sindhuli route was the Mahendra-Kanti Rajpath - Tribhuvan highway with a very long travel time which led to difficulty in communication between the Terai and the capital. Additional effects of geography causing floods and landslides further increased this travel time affecting the overall activities. Besides, Terai being the food bank of Nepal and the trade route between India and Nepal demanded for faster and sustainable route for transportation and to meet those demands Kathmandu-Terai/Madhesh Fast Track road project was initiated under the management of the Nepali Army in 2074 BS.

Kathmandu-Terai/Madhesh Fasttrack is a 70.977 km long expressway of primary class I as per Asian Highway Design Standard 1993 connecting East-West Mahendra Highway. It is the Mega Highway Project prioritized, as a "National Pride Project" having strategic significance (KTFT, 2021, p. 1). Nepali Army, 2021 states that "KTFT has been not only a boon but also a genesis for a tremendous level of socio-economic development in Nepal". The fast track will connect the starting point kilometer (km) 0.0 of Khokana (Lalitpur) to the endpoint km 70.977 of Nijgadh (Bara) at the East-West highway junction, and finally to Nijgadh Int. Airport traversing the hilly terrain with a corridor of four lanes. KTFT lies 3.9 km in Kathmandu,

6.9 km in Lalitpur, 55.7 km in Makawanpur, and 6 km in Bara district (Shrestha, 2021, p. 12). The expressway consists of 6 tunnels of about 10 km in total (3 tunnels ongoing) and about 89 bridges of about 12km in total (As per an interview conducted by Setopati). The project is divided into 13 numbers of packages of which 7 packages are being worked on whereas the other 5 are under design phase.

After the completion of the project, KTFT will serve as a bridge between Hill and the Terai bringing people of these two geographical regions together (Bhat, 2021, p. 4) besides that it will also allow the people of Terai to have access to the facilities of the capital including education, jobs, health, etc. which they have been deprived of due to the geographical boundaries, promoting the feelings of nationalism among the terai people. The KTFT Expressway also accelerates socio-cultural transformation from tradition to modernity and promotes belongingness among the multicultural communities (Bhat, 2021, p. 5).

METHODOLOGY

This paper is based on qualitative research focusing mainly on the explanatory approach and numerical data. As it is library research, it's information is largely dependent on secondary sources like books, journals, bulletins, newspapers, and other secondary sources.

The study tries to incorporate how KTFT's multifaceted impacts will help or support the development of Nepal in the coming future after its completion which is supported by various kinds of literature, case studies, and journals and uses its data for predicting how KTFT will boost Nepal's infrastructure and development.

TRAVEL TIME

Expressways are designed to reduce travel time. The places can be reached in comparatively less time. Mobility and accessibility are two aspects of transportation. Expressways provide greater mobility and less accessibility.

Expressways can reduce travel time in the following ways:

1. Highways are designed to connect multiple human settlements, and important intermediate

cities between the points. However, expressways are free from these compulsions and only two important places are selected and feasible routes considering the topographic features, are constructed along with economic considerations. Ultimately travel time is considerably reduced as the route gets shortened.

- Expressways have roads of excellent quality allowing the high speed of travel. Most highway limits the speed of the vehicle from 60 kmph-100kmph while in the case of expressways the normal allowable speed may be above 100kmph.
- One of the major reasons which increases the travel time is traffic congestion. Since highways have lots of entry and exit points, it creates inconvenience in the smooth flow of the traffic. On contrary to this expressway have very limited entry and exit points. Besides that, expressways include specially designed intersections which are constructed at significant distance ensuring the smooth transition of vehicles or flow of traffic is not obstructed.

Considering the case of KTFT, Tribhuvan Highway which connects Kathmandu to Birgunj, is 159.66 km, KTFT which connects Kathmandu to Nijgadh is 72.6 Km (proposed) allowing for a shorter travel distance resulting in the reduction of travel time from 5 hours to just above an hour. This facilitates access to facilities like education, health, jobs, new markets, etc. (Khatiwada & Aryal, 2019). Nepali Army has mentioned on its website that the KTFT will reduce the travel distance by 193 km and travel time by more than four hours (Jangi Adda, n.d.-b). This reduction in time will increase the number of trips, and there will be a continuous flow of goods between provinces.

Besides that lesser the travel time lesser the transportation cost for passengers as well as freight. Reduction in such costs will create motivation and develop certainty towards trade between two parties (Adhikary, 2021, p. 22). Similarly in case of emergency either if it's the case of health or security the personnel can use this route to travel quickly and attain their goals.

FUEL EFFICIENCY

Some of the contributing factors to fuel consumption are:

- Stoppage during traffic
- Potholes

Traffic scenario (AADT)	Petrol		Diesel		Cost ^b	
	Quantity	Unit price ^a	Quantity	Unit price ^a	Loss amount	Savings
Veh/day	Thousand liter	BDT/liter	Thousand liter	BDT/liter	Million USD	Million USD
Without project (27,334)	3319.43	86.00	41,698.50	65.00	37.45	
With project (vehicle using NH1, 13,202)	3059.04	86.00	36,708.82	65.00	33.11	4.33
With project (vehicle diverted to Expressway, 14,132)	5942.15	86.00	77,323.20	65.00		69.21
Total						73.55

^aSource: Bangladesh Petroleum Corporation (BPC) 2017; price effective from 24 April 2016

^bRate conversion: 1.00 USD = 79.98 BDT (average during 1 January 2017 to 31 December 2017)

Consistent speed can be attained on expressways which increases fuel efficiency.

It was found that an SUV consumed about 40.25 millilitres of fuel per kilometer when it travelled on the Noida Expressway, considered a good fuel-efficient road. The same vehicle consumed about 95.5 milliliters of fuel for every kilometer when traveling from Noida Expressway to Kalindi Kunj and onto Jasola (Thakur, 2017).

From going Nijgadh to Kathmandu, it takes more than 6 hours. The traffic has to face various problems like

- Stopping at numerous intersections
- Congestion
- Frequent acceleration and deceleration

This leads to an increase in fuel consumption. After the construction of KTFT, these all problems will be tackled, and eventually reduce fuel consumption.

According to the study done on the proposed Dhaka-Chittagong Expressway Bangladesh which has a length of 217 km and expected ADT(Annual Daily Traffic) after completion of the project is 14,132 and the amount of fuel saved is 5,942.15 thousand liters of petrol and 77,323.20 thousand liters of diesel per year.

This is the amount of fuel saved due to the use of a new expressway instead of using the existing 230 km long highway (NH1). This is due to the avoidance of above mentioned fuel-consuming

problems. The amount of fuel saved due to ease in driving conditions in existing NH1 highway due to divergence of traffic to the expressway is also huge. The amount saved per year in dollar a/c to Bangladesh exchange rate is shown in the following table.

Assuming the same speed of the vehicle and similar mixed traffic conditions as in the report, if we consider ADT of 5000 vehicles/day the amount of fuel saved for traveling on 71 km KTFT instead of the existing highway of almost the same length is calculated using a simple unitary method approach as:

$$\begin{aligned} & \frac{5942.15 \times 1000}{217 \times 14132} \times 71 \times 5000 \\ = & 687,873.53 \text{ liters of petrol} \\ & \frac{77323.20 \times 1000}{217 \times 14132} \times 71 \times 5000 \\ = & 8,951,067.029 \text{ liters of diesel} \end{aligned}$$

Today's (2081/2/11) petrol price is Rs. 171/l and diesel price is Rs. 154/l

The cost saved by the vehicle user by using the KTFT instead of using an existing highway of similar length is

$$\begin{aligned} & 687,873.53 \times 171 + 8,951,067.029 \times 154 \\ = & \text{Rs. } 1,496,090,550 \\ & \sim \text{Rs. } 1.5 \text{ billion per year} \end{aligned}$$

This 1.5 billion rupees saved doesn't include the fuel saved by shortening approximately 193 km of distance from Kathmandu to Nijgadh.

Again going through rough estimation; we don't need to travel an extra 193 km means we automatically saved the amount for traveling the distance (193 km). Taking only the fuel saved due to traveling an extra 193 km the amount that 5000 vehicles/day (ADT) would save is as

$$\begin{aligned} & \frac{1.5 \text{ billion}}{71} \times (193+71) \\ & \sim \text{Rs. } 5.6 \text{ billion per year} \end{aligned}$$

These numerical figures definitely prove that KTFT will improve the fuel efficiency of vehicles after its completion. Therefore, the Kathmandu Terai Fast

Track Project can be considered" the single most important prospect for the improvement of traffic conditions and the creation of a major economic impact in Nepal over the coming decade" (Dahal, Dahal, Khanal, Poudel and Khatiwada, 2014, p. 1).

ECONOMIC IMPACT

"Roads are the arteries through which the economy pulses" (Berg, 2015, np). Studies show that transport-related infrastructure can largely contribute to a nation's economic growth, poverty reduction, and social development (The World Bank, 2007, p. 10). Amidst the successful completion of the KTFT Expressway and the significant increase in roads and infrastructure development, Nepal can accelerate the pace of "trading across borders" (Rana and Karmacharya, 2014, p. 3).

Fuel efficiency would play a major role in improving the economic growth of the country. Besides, as the route reduces the travel time between hill Kathmandu and plain Terai, there will be a reduction in uncertainty of trade increasing the volume of goods transported which improves the economic activities. In the fiscal year 2074/75 (2017/18), Nepal imported goods worth NRs. 1.2 trillion and exported goods worth NRs. 81 billion. Among those, over 65% of goods imported from India, and over 56% of goods are exported to India (GoN, 2018, pp. 1,5). Moreover, 40% of the total goods supplied to Kathmandu come from Birgunj's dry port (GoN, 2017, p. 8). The KTFT will also contribute to the transportation of the goods imported and exported via the Indian border. Thus, the operation of KTFT allows for faster, cheaper, and safer transportation of these goods to desired markets.

Similarly, the tourism sector also plays a vital role in improving the economy of a country and since Nepal is rich in terms of natural resources, scenery, and beauty tourists from various countries visit Nepal. According to the Nepal Tourism Statistics 2019 by the Ministry of Culture, Tourism and Civil Aviation (GoN), the number of tourists visiting Nepal was 17.9% from India, 14.49% from China, and 7.96% from the USA. However, the KTFT enhanced connectivity can open up a viable option for tourists who come to Nepal through the southern border (Adhikary, 2021, pp. 15,16).

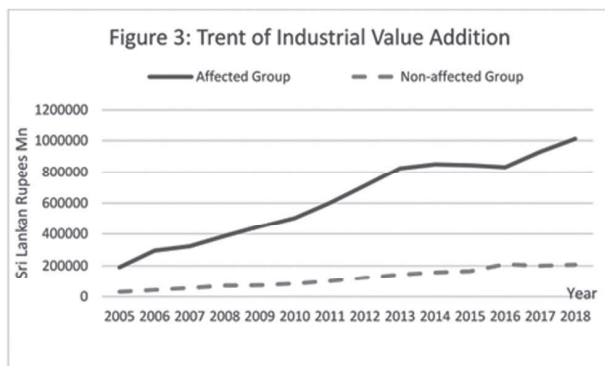
It has been expected to generate an Economic Internal Rate of Return (EIRR) of 31% (Shrestha, 2014, para. 4).

EMPLOYMENT OPPORTUNITIES

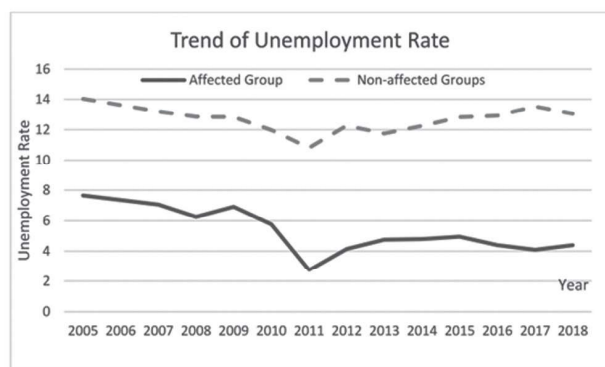
After the completion of the Southern Expressway in Srilanka (About 220km long) there was an increase in the industrial sector value addition by approximately 160 billion Srilankan rupees which account for 38% of the regional gross domestic product (RGDP) in the western and southern provinces. The unemployment rate dropped by 1.05% compared to nonaffected areas. The expressway induced 285 small and medium enterprises (SMEs), while the unemployment rate declined by 1.05% due to the expressway (Dayanath & Ichihashi, 2020, p. 76).

Having a similar population we may expect a similar pattern of growth in our economy after the construction of KTFT. The below tables give the outcomes of the southern expressway in Sri Lanka's regional economy.

TREND OF INDUSTRIAL VALUE ADDITION



TREND OF UNEMPLOYMENT RATE



Source: (Dayanath & Ichihashi, 2020)

Nepal has been facing a “Brain Drain” in the recent few years, youths of Nepal have been migrating to foreign for employment. As per the Nepal Labour Migration Report 2020 by the Ministry of Labour, Employment and Social Security (GoN), the volume of annual migration was 3,54,098 in 2017/18 and 2,36,208 in 2018/19.

This project is sure to provide employment opportunities from the labor level to the skilled level job to the people which will help them to improve the economic condition of their family and the quality of life as well. Ultimately the brain drain will be reduced and the youths will use their skills and knowledge for the development of their own country.

GEOPOLITICAL STATUS

Nepal is a landlocked and developing country's economy is highly influenced by the communication or trade with its neighboring countries i.e. India and China. The multiethnic, multilingual, and multicultural characteristics of the country have ethnic dimensions that travel across borders which makes the problems of Nepal deeply rooted in its geopolitics (Bhat, 2021, p. 4). The country's geography has always played a powerful role in determining its political and sociological processes (Singh, 2010, pp. 1-4). The geographical status of Nepal will equally benefit both our neighboring nations after the project's completion as it'd reduce the trade route between the cities of the two nations.

Geo-strategically, the KTFT Expressway not only explores the possibility of transit and trade connection between India and China but also helps enhance Nepal's bilateral relations with them (Timilsina, 2017, np). As KTFC is oriented in the North-South axis, it could be a great route for the movement of goods between India and China. Nepal can significantly benefit from 'Regional Cooperation and Integration' (RCI) as Nepal is strategically located between the two giant economies of India and China (Acharya, 2021, p. 37) and KTFC could be the key factor to do so. The KTFT could be a potential link route to possible 'multimodal economic corridors' such as the 'Kolkata-Lhasa-Kunming-ASEAN' or 'Kolkata-Kathmandu-Lhasa-Pakistan-Afghanistan-Central

Asia' Corridor (Rana and Karmacharya, 2014, p. 13).

Since Nepal is a member of the Bay of Bengal Initiative for Multi-Sectoral Technical and Economic Cooperation (BIMSTEC) and a party to the South Asian Free Trade Agreement (SAFTA), the KTFT can facilitate trade, transport, and investment among the member countries (Rana and Karmacharya, 2014, pp. 13-14). Besides that, it would also help to reestablish the trade relations with Chinese-Tibetians, and British-India that existed during the ancient period.

Since Nepal is expected to bridge between China and South Asia under BRI, it will certainly contribute to boosting the Nepalese economy. Even though Bhutan will be the easy gateway for China to trade in South Asia, China has not maintained bilateral relations with Bhutan. So, Nepal is the only gateway option for China to trade in South Asia (Acharya, 2018a, p. 4). Not only Nepal can be the transit route between India and China, but it could also act as a trading partner which would develop trilateral cooperation between Nepal, India, and China which can further be materialized as NIC cooperation (Acharya, 2021, p. 38).

ENVIRONMENTAL IMPACT

The impacts on land use will be on about 30km of agricultural land, 43km of forests, and about 3km of other land uses, bridges, etc. in the main alignment (Dahal, Dahal, Khanal, Poudel, & Khatiwada, 2014, p. 1). Besides that number of villages directly affected due to the alignment counts is 38.

The implementation of the KTFT project has brought various environmental impacts as a result of changes in the bio-physical and socio-economic environment (Dahal, Dahal, Khanal, Poudel, & Khatiwada, 2014, p. 6). After the completion of the project, the cost of the land near the expressway is sure to skyrocket. Since the project is to be carried out in the harsh topography of hills, slope stabilization is a very important factor that has been applied using suitable bioengineering techniques. Besides, the construction of retaining walls, breast walls along the slopes, and embankments along river banks have significantly reduced the effects of erosion and landslides in the

alignment-purposed area which has reduced the risk of lives.

Whereas some adverse impacts like drilling, quarrying, blasting, and running of the construction equipment and machinery will lead to the pollution of the air by dust particles, particularly in the dry season (Dahal, Dahal, Khanal, Poudel, & Khatiwada, 2014, pp. 6,7). Various chemicals used during the construction directly affect the environment if not disposed of or used with proper mitigation measures, if not done so then these chemicals get mixed with the natural drainage system of the land and ultimately the natural sources of water may get contaminated, unsafe for drinking or other household use. The heavy equipment used during the construction phase generates noise and vibration which increases the level of noise pollution. Phenol compounds in the bitumen have a low odor threshold and extremely low concentrations can cause nuisances. Its spilling can cause pollution of soil and water and also health problems which is discussed in the study of social and environmental safeguard framework (Government of Nepal, 2008).

A major portion of the alignment runs through the forest, Kathmandu 1, Lalitpur 1, Makwanpur 22, and Bara 5, in total 29 forests among which 28 are community and 1 is National forest (KTFT Bulletin IV). 96% progress has been achieved in felling trees; some 27,069 trees have been felled so far.

Clearing this large volume of trees would cause serious degradation to the environment. Environmental Impact Assessment and MoU with the Ministry of Forest & Environment has guided for plantation of trees in a 1:25 ratio (Dhakal & Pathak, 2022, p. 1) but at present the plantation ratio being followed is 1:10. Total number of saplings planted till the end of Magh,2080 BS is 705512 in the total area of 586 hectares (KTFT Bulletin IV).

Ten years from now, all the trees planted till 2021 end by the KTFT road project. The amount of carbon sequestered would sum up to 134,945 tons of CO₂ (or tCO₂e) (Dhakal & Pathak, 2022, p. 27). Nepal will receive a \$5 standard rate for every ton of carbon dioxide emission reduced (The Kathmandu Post,2021) adding up to \$674,725 revenue received through carbon trading only from the afforestation

program in the KTFT road project contributing to boost Nepal's economy as well as the environment health.

GHG's emission reduction:

Green House Gases (GHG) that are emitted from vehicles are CO₂, CH₄, NO_x, HC, CO, etc. We have a general concept that when vehicles travel they emit GHG. However, the emission rate varies according to the speed of the vehicle. Let's take a scenario where the vehicle is in a traffic jam, in this case, the vehicle remains still but the engine is burning the fuel and emits GHG. As soon as this new expressway comes into operation, traffic pressure will significantly reduce on the existing route to Terai. It will reduce noise and air pollution (Dahal, Dahal, Khanal, Poudel, & Khatiwada, 2014, p. 7).

CONCLUSION

This paper initially compares the two physical units of the transportation system and their respective characteristics.

Nepal is a geographically diversified nation, its states are distanced by the geological boundaries, especially the Terai region which had been outcasted and people are deprived of the capital's facilities due to the very long route connecting the Terai and the capital. This required a solution which came to be Kathmandu Terai/Madesh Fast Track.

Despite the various challenges to be faced during the construction of KTFT managed by the NA, support from various sectors and neighboring nations has brought the project nearly to its final stage.

To sum up, this paper reveals how the multifaceted impacts of KTFT support the economy, state development, connectedness between the provinces, diplomatic relations with the neighboring nations, and many more aspects. More importantly, it can help Nepal to enhance connectivity, technology transfer, knowledge transfer, tourism, and cultural connection among the neighboring nations.

The findings from the study suggest that the KTFT could be the harbinger in shaping the future of Nepal.

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