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DEVELOPMENT OF STRATEGIES TO PROMOTE AND FACILITATE THE IMPLEMENTATION OF THE ASIAN HIGHWAY DESIGN STANDARDS

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Executive Summary

The Asian Highway Network is a coordinated plan for the development of highway routes of international importance with a view towards promoting and developing international road transport in the region. Since the Asian Highway network was adopted in 2003, it has already played a pivotal role in assisting member countries in improving intercountry and interregional transport links.

The Asian Highway classification and design standards provide the minimum standards and guidelines for the construction, improvement and maintenance of Asian Highway routes. According to the Intergovernmental Agreement on the Asian Highway network, Parties shall make every possible effort to implement the design standards. However, the quality of the Asian Highway network across member countries is uneven. The latest 2017 updates show that to date about 9,176 km, i.e.7.25 per cent, of the network do not yet meet the minimum desirable standards. An ESCAP estimation shows that upgrading different classes of the Asian Highway network to higher quality standards needs a considerable amount of investment estimated at US$ 51.4 billion in 2017.

A survey was conducted by the ESCAP secretariat to study status of implementation of the Asian Highway design standards in the member countries in June 2017. The survey results indicated that member countries encounter several challenges to implement the Asian Highway design standards. Lack of funding is the most critical challenge. Lack of awareness as well as lack of planning and coordination also hinder the development of the routes as well as implementation of the Asian Highway design standards.

To promote and facilitate implementation of the Asian Highway design standards, the secretariat and the member countries are encouraged to take a number of initiatives including: building awareness about the Asian Highway design standards, conducting analytical studies, strengthening collaboration with the development partners, modernizing the Asian Highway design standards, promoting tourism along the Asian Highway routes, promoting finance for development of the Asian Highway network, as well as supporting establishment of an international road organization.

1. Introduction

The Asian Highway project was initiated in 1959 to promote development of international road transport. During its first phase from the 1960s to the 1980s, the project achieved considerable progress. However, the progress slowed down in 1970s.

The concept of an Asian Highway network was revived in 1992 under the framework of the Asian Land Transport Infrastructure Development (ALTID) project adopted at the 48th Commission session, following which a number of studies were implemented over the period 1993-2001 to bring the Asian Highway network to over 140,000 kilometres. Subsequently, the Intergovernmental Agreement on the Asian Highway Network[1] entered into force on 4 July 2005, marking the beginning of a new era in the development of international highways in the ESCAP region. Currently, the Asian Highway network, together with the Trans-Asian Railway network and the network of dry ports of international importance have laid the foundations for creating international integrated intermodal transport and logistics systems. The Asian Highway network is receiving priority attention in the national infrastructure development programmes of the member countries.

The Asian Highway classification and design standards[1] provide the minimum standards and guidelines for the construction, improvement and maintenance of Asian Highway routes. In those guidelines, Asian Highway routes are grouped into four classes: primary; class I; class II; and class III, which is specified as the minimum desirable standard. According to the Agreement, Parties shall make every possible effort to conform to the minimum standards, both in constructing new routes and in upgrading and modernizing existing ones.

The Asian Highway Network consists of eight core routes that substantially cross more than one subregion and a number of other routes within subregions or member countries. While these core routes offer an interesting promise for enhanced inter- as well as intra-regional connectivity, the sections that constitute them do not fall into the same class of Asian Highway classification and design standards stipulated in Annex II to the Intergovernmental Agreement on the Asian Highway Network in the countries that they traverse. Beside these technical differences, transport operation along the routes is also made difficult by the absence of a common institutional framework to regulate movements across borders.

[1] United Nations, *Treaty Series*, vol. 2323, No. 41607.

Information on the status of implementation of the Asian Highway design standards in the member countries is collected on a biennial basis and incorporated in the Asian Highway database. However, the challenges encountered by the member countries in implementing the design standards are unknown. To address the above, the secretariat, conducted a survey and reviewed the past documents related to the development of the Asian Highway network and standards towards development of a set of strategies to promote and facilitate the implementation of the Asian Highway design standards. The study was one of the components of a Capacity Development Project Activity implemented with financial and technical support of the Korea Expressway Corporation (KEC) of the Republic of Korea,

2. Design standards for the Asian Highway Network

2.1 Asian Highway Classification and Design Standards

Design standards for the AH Network are set out in Annex II on "Asian Highway Classification and Design Standards" to the Intergovernmental Agreement on the Asian Highway Network (referred to herein as the Asian Highway design standards)[2] was adopted on 18 November 2003 by an intergovernmental meeting held in Bangkok, was open for signature in April 2004 in Shanghai and entered into force on 4 July 2005. The Annex II to the Agreement provides the minimum standards and guidelines for the construction, improvement and maintenance of Asian Highway routes. The Standard is summarised in table 1.

Table 1: Asian Highway Standards summary

Highway classification		Primary (4 or more lanes)				Class I (4 or more lanes)				Class II (2 lanes)				Class III (2 lanes)			
Terrain classification		L	R	M	S	L	R	M	S	L	R	M	S	L	R	M	S
Design speed (km/h)		120	100	80	60	100	80	50		80	60	50	40	60	50	40	30
Width (m)	Right of way	(50)				(40)				(40)				(30)			
	Lane	3.50				3.50				3.50				3.00 (3.25)			
	Shoulder	3.00		2.50		3.00		2.50		2.50		2.00		1.5 (2.0)		0.75 (1.5)	
	Median strip	4.00		3.00		3.00		2.50		N/A		N/A		N/A		N/A	
Min. radii of horizontal curve (m)		520	350	210	115	350	210	80		210	115	80	50	115	80	50	30
Pavement slope (%)		2				2				2				2 - 5			
Shoulder slope (%)		3 – 6				3 – 6				3 – 6				3 - 6			
Type of pavement		Asphalt/cement concrete				Asphalt/cement concrete				Asphalt/cement concrete				Dbl. bituminous treatment			
Max. superelevation (%)		10				10				10				10			
Max. vertical grade (%)		4	5	6	7	4	5	6	7	4	5	6	7	4	5	6	7
Structure loading (minimum)		HS20-44				HS20-44				HS20-44				HS20-44			

Notes: Figures in parentheses are desirable values.
Minimum radii of horizontal curve should be determined in conjunction with superelevation.
The recommended width of the median can be reduced with the proper type of guard fence.
The Parties should apply their national standards when constructing structures such as bridges, culverts and tunnels along the Asian Highway.

2.2 Asian Highway Database

The Asian Highway Database, which contains, among other things, information on compliance with minimum standards, is updated biennially by the secretariat. The Asian Highway network currently comprises of 142,781 km of roads (including 15,400 km potential Asian Highway routes in China) passing through 32-member countries. The latest

[2] United Nations, *Treaty Series*, vol. 2323, No. 41607, annex II.

2017 updates[3] show that to date about 9,176 km, i.e.7.25 per cent, of the network do not yet meet the minimum desirable standards. Progress in upgrading Asian Highway routes between 2008 and 2017 is shown in figure 1. During the period, about 6,732 km, i.e. 4.5 per cent of the network, were upgraded to a higher Class of standards. Information from the Asian Highway Database is available to member countries and development partners through the ESCAP website at:

http://www.unescap.org/resources/asian-highway-database.

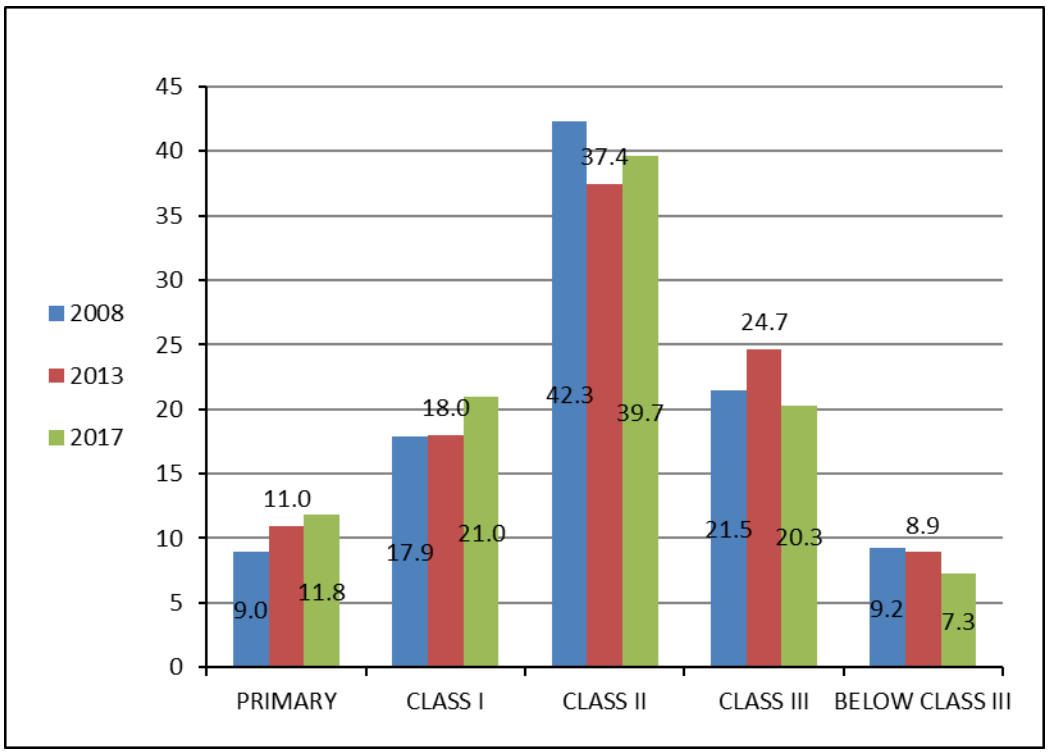
According to the latest updates in 2017, two-thirds of the AH Network is made up Class I, Class II and below Class III roads. Notably:

- China, India, Iran, Kazakhstan and the Russian Federation account for about half of the AH network.
- China accounts for more than half of all Primary class roads.
- India, Islamic Republic of Iran and Thailand account for more than half of all Class I roads.
- India, Islamic Republic of Iran, Kazakhstan and Russian Federation account for more than half of all Class II AH roads (the Russian Federation alone accounts for almost one quarter of all Class II roads).
- Kazakhstan, Lao People's Democratic Republic, Pakistan and Turkmenistan account for more than half of all Class III AH roads (Kazakhstan accounts for almost one quarter of all Class III roads).

At present, roads of Class III or lower standards account for about 28% of the network. As the AH network is ever undergoing improvements. It is expected that the percentage of these low standard roads will decrease steadily. Some roads in the AH network traversing mountains have very tight alignment and narrow cross-sections over sheer drops e.g. AH4 China-Pakistan Highway (Karakoram Highway) and AH42 China-Nepal Highway (Friendship Highway). Major transformations were underway for the former and upgrading was being planned for the latter. Nevertheless, a proportion of roads will remain to be Class III or lower standard in the foreseeable future due to economic and technical difficulties for upgrading.

[3] As of 20 August 2017, updated data was received from 14 Asian Highway member countries.

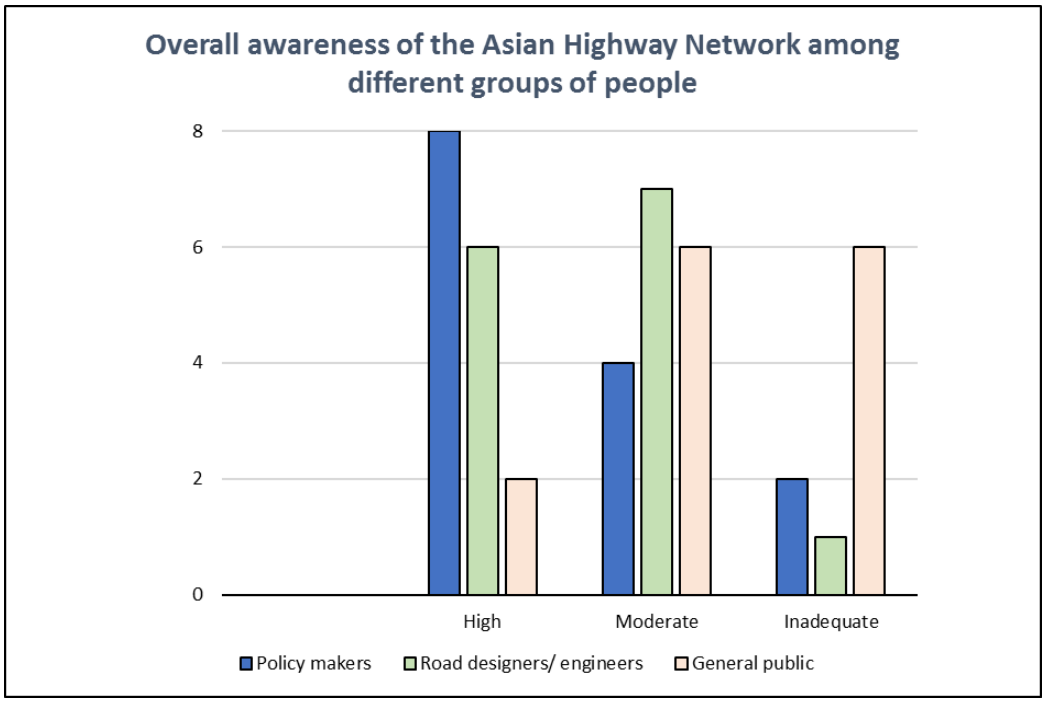
Figure 1 Proportion of Asian Highway routes by class, 2008, 2013 and 2017



3. Survey on the current implementation status

As a part of the study towards developing strategies to promote and facilitate the implementation of the Asian Highway design standards; the ESCAP secretariat conducted a survey to gather information from the member countries about the status and practices related to the implementation of the design standards as stipulated in the Annex II to the Intergovernmental Agreement on the Asian Highway Network[2,4]. The survey questionnaire was developed in-house by the secretariat which was circulated among all 32 Asian Highway member countries in June 2017. The questionnaire included 11 questions about status and challenges encountered by the member countries towards implementation of the standards. Fourteen-member countries responded to the questionnaire as of August 2017.

Figure 2: Awareness about the Asian Highway network



The survey indicated that overall awareness about the Asian Highway network was high among policy makers, moderate among road designers/ engineers and inadequate among the public. Seven of the fourteen responding countries indicated that design engineers had moderate knowledge about the Asian Highway network as well as design standards. Six

[4] Available at: http://www.unescap.org/resources/intergovernmental-agreement-asian-highway-network

countries reported that public had inadequate awareness about the Asian Highway network as well as design standards.

Five of the member countries indicated that good progress and nine countries reported that moderate progress had been achieved in terms of quality of the road infrastructure since the adoption of the Asian Highway network in 2003. However, five different challenges were emphasized by the responding member countries. Figure 4 shows that lack of funding was the most critical barrier towards achieving quality road infrastructure of the Asian Highway network.

Figure 3: Awareness about the Asian Highway design standards

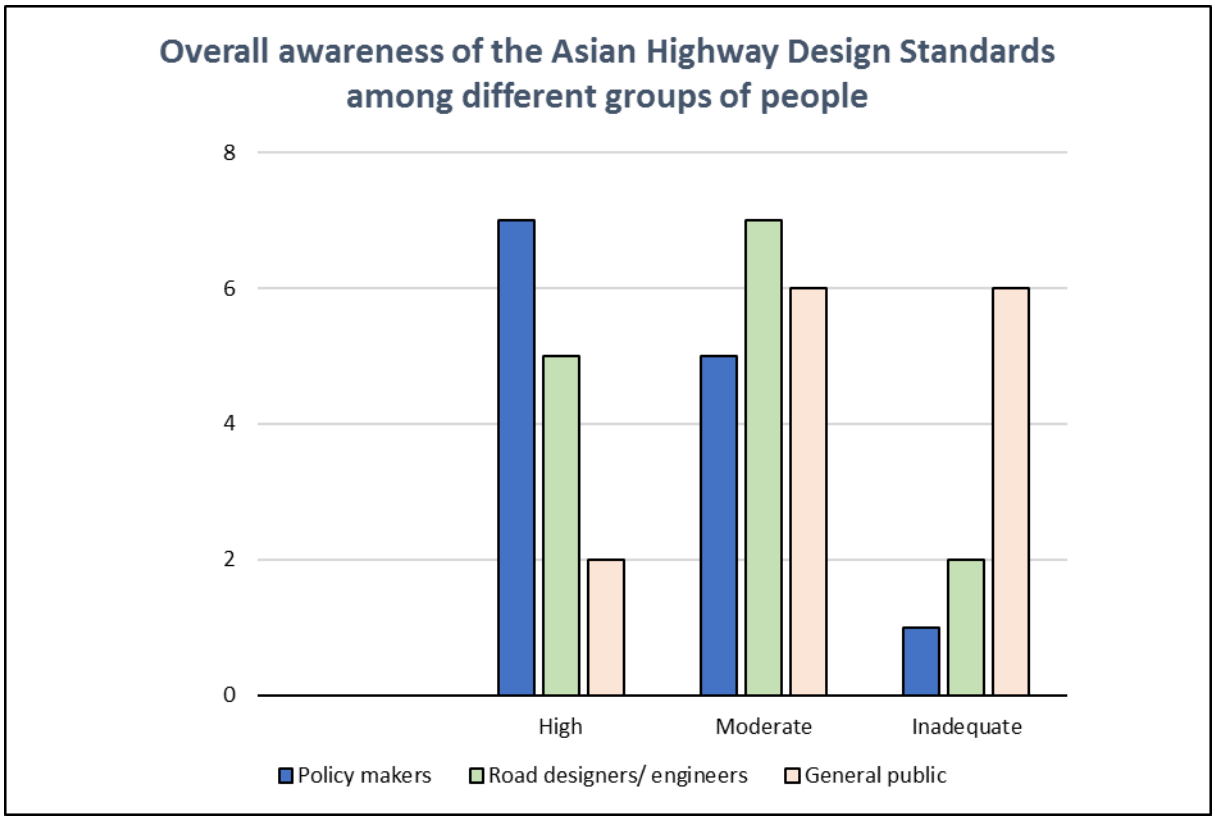


Figure 4: Challenges encountered in achieving progress of road network

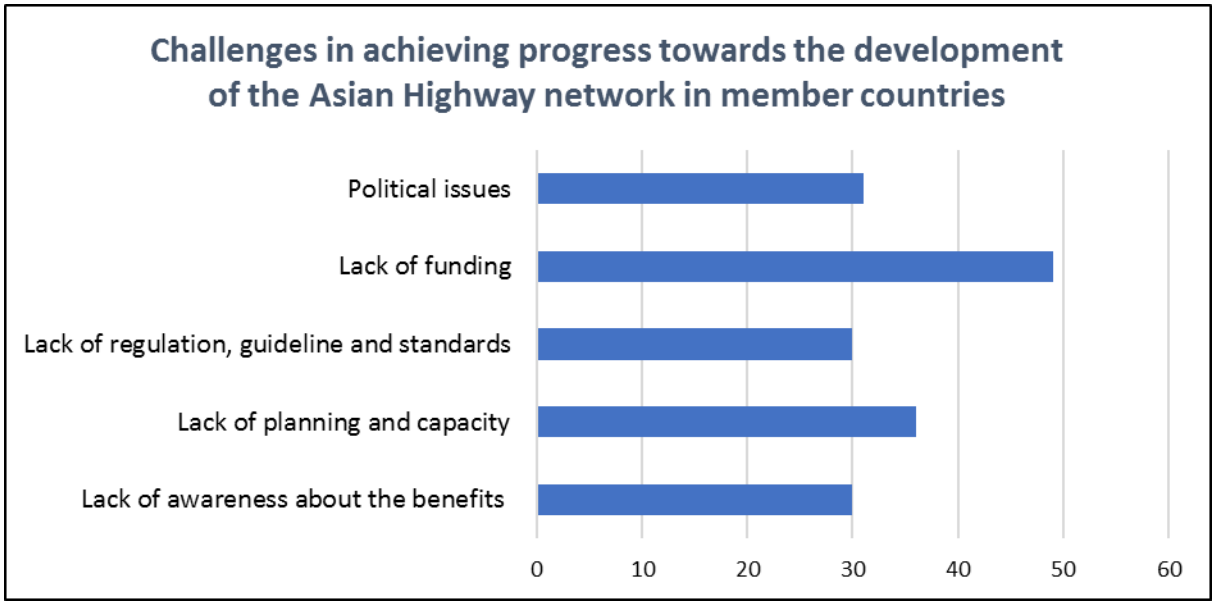
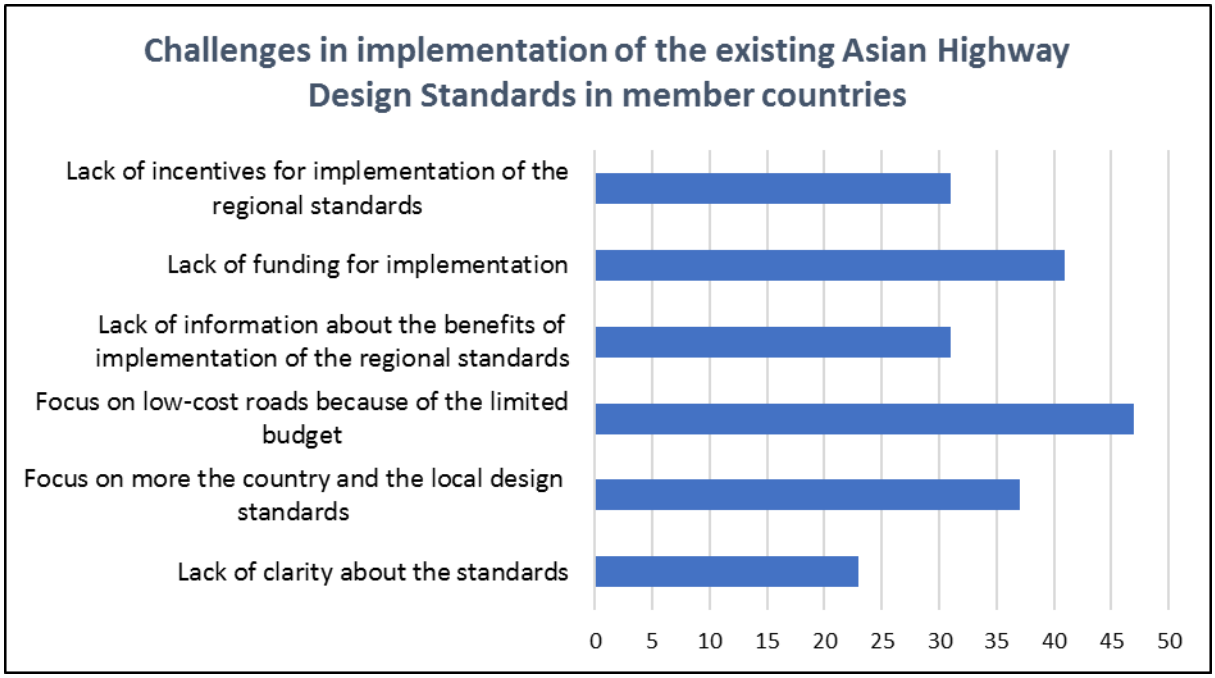


Figure 5: Challenges encountered in implementing the Asian Highway design standards

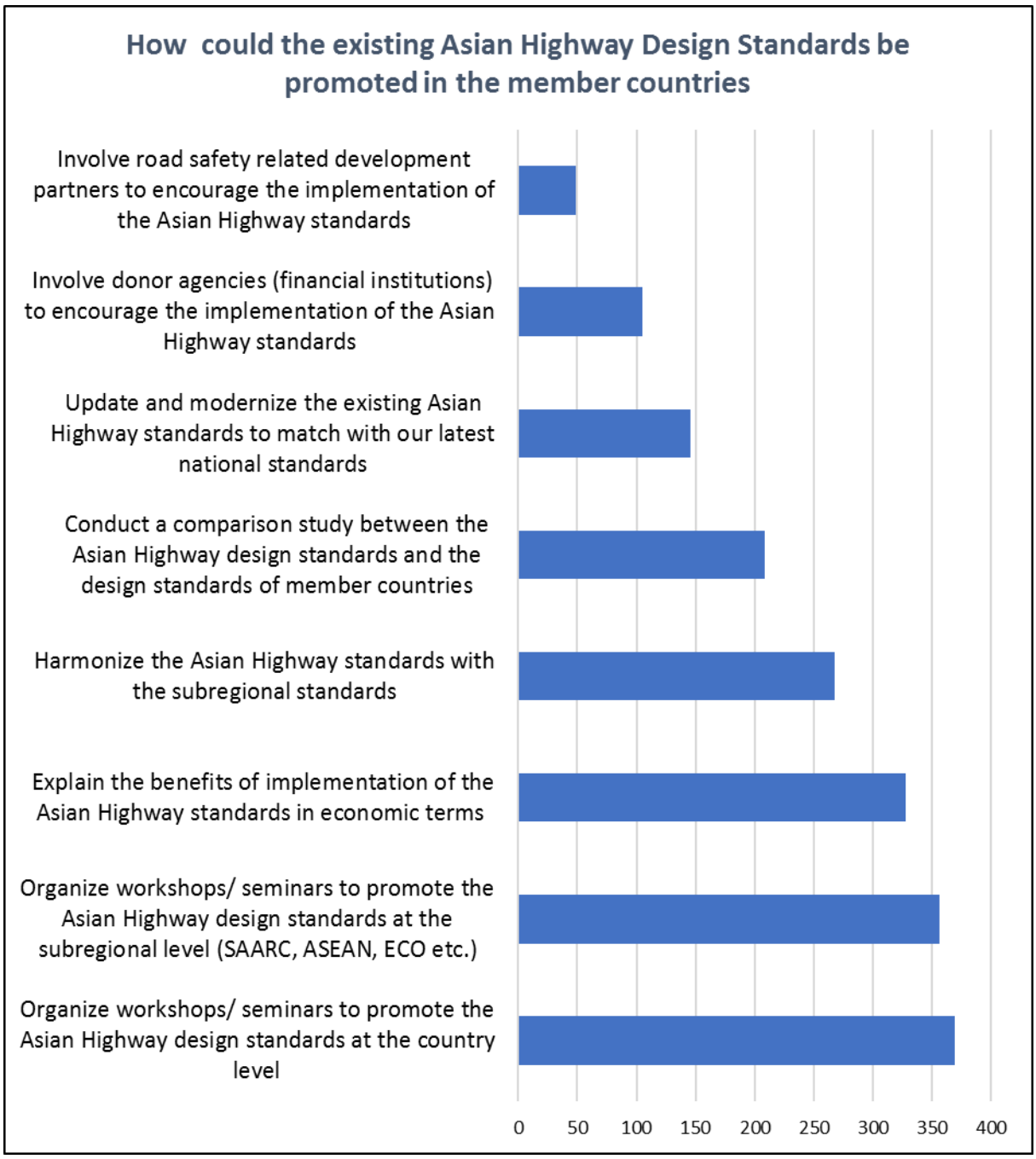


The member countries of the region encounter various challenges in implementing the Asian Highway design standards. The survey indicated that the design standards could be fully implemented in four and partially implemented in nine of the fourteen responding member countries. Figure 5 shows the key challenges to implementing the Asian Highway design

standards in the member countries. In many occasions, the Asian Highway design standards could not be implemented as countries had to design and construct low-cost roads due to shortage of funds. The survey responses indicated that lack of funding for implementation was one of the most critical barriers in implementation of the design standards. Another barrier identified was excessive focus on the country and local design standards.

A number of proposed measures could be identified for promoting the Asian Highway design standards. The responding member countries put emphasis on organizing workshops at the national as well as subregional level as shown in figure 6.

Figure 6: Recommended measures for promoting the Asian Highway design standards



4. Recommended Strategies

To promote and facilitate the implementation of the Asian Highway design standards[2], the following initiatives are considered:

4.1 Awareness building about the Asian Highway and it's design standards

The development of modern and efficient road infrastructure through effective implementation of the design standards as stipulated in Annex II to the Intergovernmental Agreement on the Asian Highway Network would be closely linked to the ability of the member countries to understand, develop and maintain the details of the technical standards, develop technical as well as financial capabilities to implement the standards, as well as to operate the road systems efficiently to meet economic and social objectives. The survey results in figure 3 shows that overall awareness about the design standards among road designers/ engineers was rated moderate in seven of the 14 responding member countries. Moreover, the most recommended actions to promote the Asian Highway design standards were to build awareness in the member countries as shown in figure 6.

In this regard, the following activities are recommended:

a) organizing workshops/ seminars to build awareness on the Asian Highway design standards i) at different levels: national level, subregional level and regional level, ii) among policy makers and road planners/ designers for promoting implementation in the member countries, iii) through organizing information session on providing basic information to the general public and stakeholders, iv) among development partners including international, regional, subregional, bi-lateral financial institutions as well as road safety related institutions.

b) involving mass media, such as television, radio, newspapers about the Asian Highway network would be useful. An example of cooperation with the mass media is the video produced on the Asian Highway network prepared by Media Purme, known as MBC- a media broadcaster from the Republic of Korea in October 2016 which helped to promote the Asian Highway network and the design standards in the Republic of Korea. Additionally, display of the video produced by the Korea Expressway Corporation (KEC)

on “Great Roads lead to Great History” at the national, subregional and regional levels by the ESCAP secretariat would be beneficial.

c) organizing dedicated events, such as symposium and rallies would highlight the Asian Highway network and create an awareness at different sectors of national economies. Historically, the auto-rally jointly organized by the Automobile Association of Singapore, Tourism Authority of Thailand, which was sponsored by the ESCAP secretariat back in 1997 is an example of an effective promotional event. In the event, participants included small children to elderly people who equally enjoyed the activity and the opportunity to explore major attractions along the Asian Highway route AH2.[5]

4.2 Conducting analytical studies related to the Asian Highway design standards

As the leading intergovernmental organization in the region, ESCAP secretariat has already mobilized its multi-sectorial analytical capacity and political consensus-forming capability to support a transition to a more integrated and better-connected Asia-Pacific region. ESCAP’s aim in enhancing the Regional Economic Cooperation and Integration (RECI), which could be mainstreamed along the existing Asian Highway network adopted by the member countries in 2003. The work that ESCAP is already doing to enhance RECI across the region will strengthen the road transport connectivity and pave the way for the development of the Asian Highway corridors. The potential studies may include:

a) Comprehensive economic analysis for developing Asian Highway routes

To understand better about the overall benefits and costs of the eight international economic corridors of the Asian Highway network would be beneficial. Detailed analysis could be undertaken to demonstrate how benefits of the road transport connectivity could be realized through reduced transport costs as a result of economic diversification. Research has shown that a one per cent improvement in quality of transport infrastructure will deliver 0.7 per cent increase in exports in the member countries.[6]

[5] United Nations, *Joint ESCAP-Japan Symposium on Asian Highway Development (1997)*
[6] Available from the ESCAP website: http://www.unescap.org/op-ed/china-belt-and-road-initiative

b) Feasibility studies for Asian Highway sections located in multiple countries

Pre-feasibility and feasibility studies of road projects are usually conducted by the responsible road agencies of an individual member country. The studies utilize local data that are available from secondary sources. One of the limitations that these studies have is lack of consideration of the traffic generated in a different country and inability to consider the transit traffic.

To facilitate the promotion and development of Asian Highway investment, prefeasibility studies of selected routes in Bangladesh, Kyrgyzstan, Mongolia and Myanmar were conducted in 2013 by ESCAP secretariat through the financial support from the Korea Expressway Corporation (KEC). An attempt was made by the study team to understand the broader development contexts of the project, including future potential benefits due to improved domestic and cross-border connectivity with the neighbouring countries. However, these understandings were mainly qualitative in nature. The study recommended a full-scale feasibility study to investigate further and examine how the benefits of enhanced cross-border connectivity may be assessed and evaluated for use in a conventional economic or investment analysis.[7] It is recommended that the ESCAP secretariat conduct feasibility studies of potential road projects along the Asian Highway involving multiple countries in which economic benefits achieved through cross-border road traffic would be quantified and incorporated.

c) Comparative studies among different road design standards

Individual countries have their own road design standards and guidelines. These standards have at least some differences among themselves. Comprehensive studies are necessary to assist member countries in assessing the differences between their own national or local standards and the Asian Highway standard. The analytical studies would provide useful information for the member countries as well as stakeholders (for example, subregions) for adjusting their own design standards for further harmonizing their design standards with the regional standards.

[7] ESCAP study report on *Promotion of Investment in the selected Asian Highway Routes in four countries (Bangladesh, Kyrgyzstan, Mongolia and Myanmar,* Final Report, 2013.

Similarly, the subregional organizations also have their own road design standards. For example, an analysis conducted by the ESCAP secretariat revealed the following differences between the Asian Highway design standards and the Association of South East Asian Nations (ASEAN) road design standards.

Table 2: Differences between the Asian Highway (AH) and the ASEAN Highway (AHN) road design standards

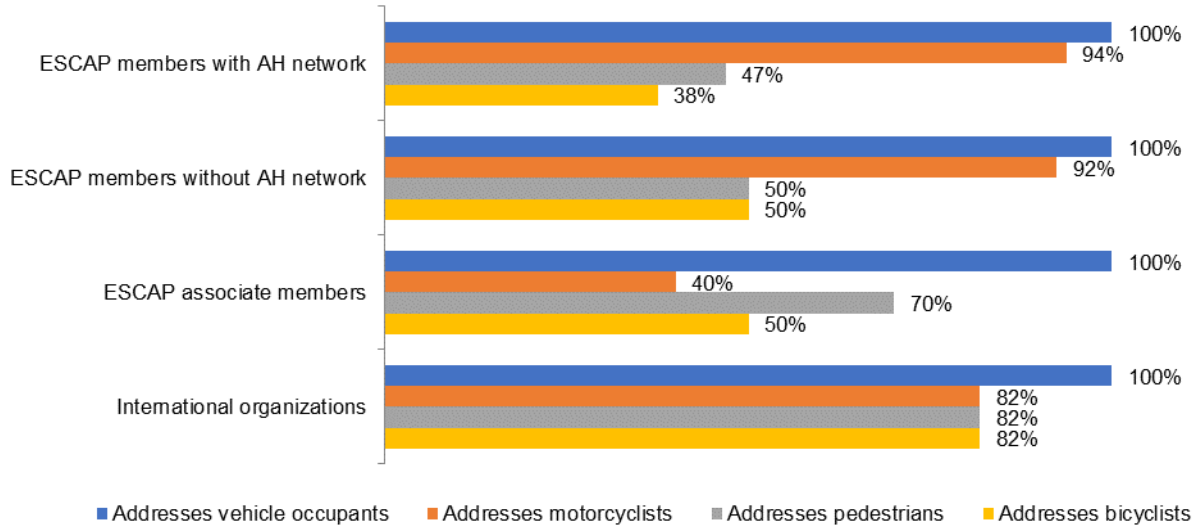
The terrain classifications are different: the "steep terrain" is not considered in the ASEAN Highway (AHN) standard. The Asian Highway standard includes and defines the "steep terrain" as more than 60 per cent gradient.
The AHN standard has different right-of-way (ROW) and maximum super-elevation requirements for urban and rural settings. The Asian Highway standard does not differentiate between the urban and rural settings of the road.
The AHN standard does not provide any information on the pavement slopes and the shoulder cross slopes. The Asian Highway standard has well specified pavement slope and the shoulder slope values.
The Asian Highway standard allows 10% maximum super-elevation for all classes of roads. The AHN standard specifies different maximum super-elevation values for urban and rural settings. For an urban primary class road, the maximum super-elevation is 6%.
The AHN standard is flexible in terms of maximum vertical gradient of the pavement in the longitudinal direction. For class III level terrain, it allows a vertical gradient up to 6%. The Asian Highway standard limits this value to 4%.

The secretariat, with financial and technical support from the Korea Expressway Corporation of the Republic of Korea, was conducting a study[8] during 2015-2017 on the development of road infrastructure safety facility standards for the Asian Highway Network. As a part of the literature review, road design standards of many member countries as well as organizations were reviewed and analysed. The analysis showed that across the 115 documents reviewed, all referred to vehicle occupants, most of the documents referred to motorcyclists, and

[8] The study was a major part of a 3-year duration project supported by the Korea Expressway Corporation (KEC).

significantly fewer referenced pedestrians and bicyclists (figure 7). For example, of the documents from ESCAP member countries with an Asian Highway route, all the documents reference vehicle occupants; 94% reference motorcyclists; 47% reference pedestrians; and 38% reference bicyclists. This finding is potentially of significance, given that in many of the Asian Highway member countries, vulnerable road users – especially pedestrians – account for a significant percentage of road deaths. The Asian Highway design standards refer to vehicle occupants, pedestrians and bicyclists, but no reference to motorcyclists is made.

Figure 7: Road user citations in road design guides and standards reviewed



4.3 Strengthening collaboration with the development partners

To strengthen the ongoing efforts of the ESCAP secretariat in collaborating with different development partners would be key to the promotion and development of the Asian Highway network. Encouraging development partners including i) financial institutions, for examples, World Bank, the Asian Development Bank (ADB), the Asian Infrastructure Investment Bank (AIIB), as well as bi-lateral donors; ii) subregional organizations, for example, Association of South-east Asian Nations (ASEAN), South Asia Association of Regional Cooperation (SAARC), the Economic Cooperation Organization (ECO); and iii) road safety related agencies, for example, Global Road Safety Facilities (GRSF) of the World Bank, International Road Federation (IRF) to put priority on the Asian Highway network and implementation of the design standards.

a) An example of a donor coordination in Kazakhstan for a regional corridor

The development objectives of the East-West Roads Project in Kazakhstan are to increase transport efficiency along the section from Almaty to Khorgos (Horgos) of the Western Europe-Western China road corridor within Almaty Oblast and to modernize highway management on sections of the corridor. The 305-kilometre road section is being upgraded to a 4-lane highway including new alignments under a World Bank funded project which was approved in 2012 and scheduled to complete in 2017. The Corridor (Asian Highway 5, CAREC corridor 1b and E40) is the road section with the most impact on the regional economy, being a transit link for goods imported from China to Kazakhstan and other Central Asian countries.[9,10] as shown in figure 8.

Figure 8: East-West Roads project in Kazakhstan

The total cost of the project is approximately USD1.25 billion. The project is a part of the overall Western Europe-Western China Corridor Development Program which had already

[9] Available at: http://documents.worldbank.org/curated/en/989541482446456878/pdf/ISR-Disclosable-P128050-12-22-2016-1482446447275.pdf

[10] Available at: http://documents.worldbank.org/curated/en/399771468273028917/pdf/649350PAD0P1280Official0Use0Only090.pdf

received financial supports from International Financing Institutions (IFIs) including the World Bank, the Asian Development Bank (ADB), the Islamic Development Bank (IsDB), the Japan International Cooperation Agency (JICA) and the European Bank for Reconstruction and Development (EBRD).

b) An example of a subregional cooperation in South Asia

The South Asia Subregional Economic Cooperation (SASEC) Road Connectivity Project in Bangladesh is a part of the AH2 and AH41 routes. The overall project cost of USD410 million being shared among the Asian Development Bank (ADB), The OPEC Fund for International Development (OFID), Abu Dhabi Fund for Development and the Government of Bangladesh. The project was approved in April 2013.[11]

Figure 9: SASEC road project in Bangladesh

[11] Information from Roads and Highways Department (RHD), Bangladesh in February 2017

4.3.1 Enhancing cooperation with the United Nations Regional Commissions

The Asian Highway network spreads over two continents, Asia and Europe. As a result, a portion of the Asian Highway network overlaps with the European E-road network developed under the auspices of the Economic Commission for Europe (ECE). These roads provide a basis for road transport connectivity between the two continents. Moreover, the Asian Highway route AH2 extends up to the border of Iraq, one of the member countries of the Economic and Social Commission for Western Asia (ESCWA). Therefore, enhancement of cooperation among the regional Commissions would be essential.

ESCAP and ECE have a long history of collaboration. In recent years, this collaboration has been most active in co-managing the implementation of the United Nations Special Programme for the Economies of Central Asia (SPECA) which includes joint areas of work in transport and border crossing. The two Commissions have also combined their expertise in the Euro-Asian Transport Links project. However, these programmes and projects mainly cover countries in the programme/project areas. The Euro-Asian Transport Links activities which are in line with the development of the Asian Highway network are one element among others that each regional Commission must implement within its respective work programme. In addition, it is also more difficult for the least developed economies of the ESCAP region to implement projects trying to reach markets in Europe. As a result, more pressing development issues take precedence over the improvement of connectivity between Asia and Europe.

In view of the above, the Regional Action Programme for Sustainable Transport Connectivity in Asia and the Pacific, phase I (2017-2021) adopted by the Transport Ministers of the Asia Pacific region during the “Third session of the Ministerial Conference on Transport” in Moscow includes one of the objectives to work towards the establishment of an interregional coordination committee on transport between Asia and Europe designed to foster seamless sustainable transport connectivity between Asia and Europe for people and goods. The committee would be integrating its work with the two existing regional commissions and ensure equal awareness of and interest in implementing related projects, in particular in working towards a harmonization of standards and rules. More importantly, each Commission would be able to push the same agenda, on the same timetable, according to the same priorities. The initiatives might include the development of the Asian Highway network as an integral part of the overall mandates of the coordination committee.

4.3.2 Enhancing cooperation with the ongoing regional initiatives

The development of the Asian Highway network and promoting the design standards stipulated in the Intergovernmental Agreement on the Asian Highway network could be achieved through the ongoing and strengthened cooperation with other regional initiatives.

A large number of national initiatives have been launched to improve the regional as well as Asia-Europe road transport connectivity. For instance, the Chinese Silk Road Economic Belt and the Twenty-first Century Maritime Silk Road, commonly referred to as the Belt and Road Initiative, share this objective. Likewise, the Eurasia initiative of the Government of the Republic of Korea aims to bind together the two regions as one continent. Kazakhstan proposed the Western Europe and Western China initiative to upgrade transport links in Central Asia to facilitate transit between the two continents. Other initiatives with a more limited geographic scope also contribute to the grand scheme of the connectivity along the Asian Highway routes, such as the Central Asia-South Asia initiative undertaken by Afghanistan, Kyrgyzstan, Pakistan, Tajikistan and Turkmenistan.

The Asia-Europe Meeting (ASEM) is an intergovernmental process established in 1996 to foster dialogue and cooperation between Asia and Europe. Presently it comprises 53 partners: 30 European and 21 Asian countries, the European Union and the ASEAN Secretariat. ASEM addresses political, economic, social, cultural, and educational issues of common interest, in a spirit of mutual respect and equal partnership. The road connectivity agenda of ASEM complements the overall initiative of the development of the Asian Highway network. Strengthened cooperation with the ASEM initiatives would be necessary.

The Belt and Road initiatives (BRI) led by the Government of China is a long-term plan to deepen economic integration, support trade, investment and infrastructure development in Asia and across Europe and Asia. One of the goals is to develop economic corridors which include the existing Asian Highway routes along the old Silk Road connecting Asia to Europe. In addition to powering growth in the regional and global economy, it could also make a major contribution to meeting the goals of the 2030 Agenda for Sustainable Development and the Paris Agreement on climate change. Moreover, the BRI, through its aim of establishing comprehensive and seamless intermodal transport links along its corridors can reinforce regional plans of transport connectivity. Road corridors developed through the BRI could benefit from the existing Framework Agreement on the Asian Highway network

developed under the auspices of ESCAP. In this regard, ESCAP can facilitate the regional cooperation and coordination needed to help take the BRI forward. ESCAP's intergovernmental platform coupled with its multi-sectoral technical expertise can support the development of the multilateral agreements needed to underpin the development of large scale cross border projects. Capitalizing on the momentum generated by the BRI initiatives, the member countries can achieve considerable progress towards the development of the Asian Highway network. However, these initiatives will achieve sustainable and long-term impact only if greater coordination and synergy among the member countries are developed.

4.4 Updating and modernizing the Asian Highway design standards

The Asian Highway classification and design standards were developed through an ESCAP project called ALTID (Asian Land Transport Infrastructure Development) during 1992-1993. The classification and design standards were proposed and endorsed as general guidelines for the Asian Highway Network by an Expert Group Meeting held from 29 November to 3 December 1993 in Bangkok. This was the first revision of both the classification and the design standards from the original "Classification and Design Standards for the Asian Highway" developed in 1974. The classification and design standards were included as Annex II to the Intergovernmental Agreement on the Asian Highway Network.[4]

It has been more than two decades since the latest version of the Asian Highway classifications and design standards were developed in 1992. Since 1990s, the economic growths as well as the technological developments in the region have changed the ways how roads are planned, designed, constructed, maintained and managed. Since most of the Asian Highway member countries have their own design standards, the design standards for the Asian Highway Network need to address the technological developments in the member countries to facilitate international road traffic.

Moreover, the existing design standards do not include some important design parameters, for examples, sight distance requirements, structural design of shoulders and consideration of the traffic mix in the design. In this regard, the member countries may consider the importance of improving and updating the existing classification and design standards for the Asian Highway network.

Table 3 includes Stopping Sight Distance (SSD) values in different Asian Highway member countries as well as other international sources.

Table 3. Stopping Sight Distance Values (in meters) for selected countries

Countries	Design Speed km/h						
	120	100	80	60	40	30	20
China	210	160	110	75	40	30	20
China (Trucks)	245 [273]	180 [200]	125 [139]	85 [95]	50	35	20
Thailand	-	185	130	85	50	35	20
Bangladesh	-	180	120	-	-	-	-
India	-	180	120	80	45	30	20
Korea	215	155	110	75	40	30	20
France	235	160 [187]	105 [121]	65 [72]	35 [40]	25 [26.5]	15 [15.5]
UK	295(215)	215(160)	150(110)	90(70)	-	-	-
UK(MS)	-	-	-	56	31	20	12
TERN	200	150	100	70	-	-	-
TEM	200 {250}	150 {188}	100 {125}	-	-	-	-

[ ] Values to be adopted at maximum gradient permitted for the road class in China
( ) Values of "one step relaxation" not to be used at immediate approach to intersections but acceptable on free-flow link sections in the UK
UK(MfS) Manual for Streets, for urban streets with design speed =< 60km/h based on a= 4.41m/s
{ } To be increased by 25% at curves with radius less than 5V, where V = speed in km/h
TERN Trans-European Road Network (International E-Roads)
TEM Trans-European North-South Motorway

4.5 Developing tourism along the Asian Highway

The potential for tourism along the Asian Highway is growing. For an example, a total of 7.9 million Chinese tourists visited Thailand in 2015, an increase of 70 per cent over 2014. The Ministry of Tourism and Transport in Thailand reported that in 2016 Association of South East Asian Nations (ASEAN) tourists preferred driving on their own cars to visit Thailand over public transport increasing the arrival figures of personal cars at almost all immigration checkpoints in Thailand. According to immigration authorities of Thailand, Chinese tourists continued to come to Thailand, with most opting to drive into the northern region to tour the country on their own. During November 2015-February 2016, over 6,000 Chinese cars passed through the Chiang Khong checkpoint to Chiang Rai in Thailand which is on the Asian Highway route AH3.[12]

12 http://englishnews.thaipbs.or.th/meeting-ensure-road-safety-tourists-now-travel-personal-cars-thailand/

However, the situation varies across the Asian Highway member countries. An ESCAP study in 1999 showed that one of the major problems related to access to tourism attractions along the Asian Highway was the condition of the road infrastructure.[13] Although the condition of the road infrastructure along the Asian Highway has improved during the last two decades, it remains as a barrier to the development of tourism. There are diverse types of challenges encountered by the tourists. Some archaeological sites that could be tourist attractions are off the Asian Highway network and access roads are not of international standards. Sometimes roads providing access to major sites are overcrowded and congested. The relationship between the travel demand by the international tourists and development of the international routes is a chicken and egg dilemma. However, there is no doubt that the improvement of the road conditions will increase tourist volumes justifying the economic feasibility of the development of the Asian Highway routes.

In this context, the following actions could be taken: i) regional actions to develop tourist sites providing rest areas and information centres, ii) promotional campaigns of tourism attractions along the Asian Highway including through various advertising media, iii) organizing seminars and special events on promotion of tourism, iv) development of an updated Asian Highway tourist map; v) guidelines for tourists related to different traffic systems, and vi) government agencies related to road development and tourism could more closely coordinate on how the development of tourism and the Asian Highway development could complement each other. Because, the social and economic benefits from tourism could help to rationalize the government budget allocations that are required to improve the road conditions.[7]

4.6 Promoting financing for the Asian Highway

The financial requirements for developing and maintaining the infrastructure necessary for economic and social development in the Asian Highway member countries are massive. Most estimates for infrastructure investment in Asia are related to the national infrastructure needs. There are no comprehensive studies assessing the road infrastructure investment needs for regional infrastructure across Asia and the Pacific. An ESCAP estimation as shown in table 4, indicates that upgrading of the Asian Highway routes in 2017 would require a total of USD 51.4 billion.

13 ESCAP study on "Tourism Development Along the Asian Highway", New York (1999).

Table 4. Financial needs estimation* for the Asian Highway network

Interventions	Estimated cost in USD (2017 figures)
Upgrading 9,943 kilometers of below Class III roads to Class III standard meeting the minimum requirements as stipulated in the Annex II to the Agreement on the Asian Highway network	3.5 billion
Strengthening pavements of 26,833 kilometers of Class III roads to Asphalt Concrete (Class II) without widening and geometric improvements	7.6 billion
Upgrading of 55,343 kilometers of Class II roads to Class I (4-lane) standard	40.3 billion
Total investment needs	51.4 billion

**ESCAP estimation based on localized unit costs assumed.*

An Asian Development Bank study[14] showed that indicative investment needs for regional infrastructure by regional/subregional programme for the road sector in the Central Asia Regional Economic Cooperation (CAREC) subregion would be USD 24.6 billion, in the Greater Mekong Subregion (GMS) would be 13.3 billion and South Asia Subregional Economic Cooperation (SASEC) subregion would be USD 24.4 billion. Governments have experienced that current budgetary resources are insufficient for the task. Consequently, they are faced with the basic economic problem of allocating scarce financial resources among virtually unlimited wants. In this condition, one of the major challenges related to the development of the Asian Highway network is the lack of funding. As supported by figure 4 and 5, lack of funding hinders the development; as well as the constrained budget allocation compels road agencies to accept for lower-cost roads which often do not meet the minimum requirements of the Asian Highway design standards. Moreover, notwithstanding different financing capabilities, planning the upgrading of Asian Highway routes is made difficult by the fact that they do not have the same level of priority among the Asian Highway member countries concerned.

The Asian Highway member countries could be provided with advisory supports on several options to address the above:

[14] Asian Development Bank: *Meeting Asia's Infrastructure Needs.* Special Report 2017, Manila. Available from: https://www.adb.org/sites/default/files/publication/227496/special-report-infrastructure.pdf

i) to be able to recognize the importance of economic and social infrastructure investment projects related to the Asian Highway network in the development process and subsequently reprioritize it in the budget allocation and external borrowing process. This could include promoting road funds at the national and provincial levels.

ii) to seek alternative mechanisms for financing, developing, operating and maintaining Asian Highway infrastructure through adopting a suitable public-private-partnership (PPP) model.

iii) to establish an Asian Highway infrastructure development fund at the regional level for supporting member countries to implement Asian Highway design standards while developing their routes. The proposed fund could be a multi-donor trust fund including bi-lateral as well as international financial institutions. The proposed fund may work with other regional funds, for example the "Silk Road Fund".[15] An Asian Development Bank Institute study[16] concluded that regional development funds can help financing early stage development and project construction involving multiple countries, especially where there is economic disparity among the participating countries and their ratings. It is especially helpful where it is difficult to ascertain benefits to the countries and hence allocate economically developed Asian Highway member countries could invest (for example, the Asian Infrastructure Investment Bank), initially at the sovereign level to nurture project development, and thus create a platform for larger private sector participation at a later stage.

4.7 Supporting establishment of an international road organization

The road sector around the world is facing overwhelming challenges under the sustainable development agenda of the United Nations. Addressing those challenges needs strong intergovernmental support at the international level to promote coordinated strategies, recommend harmonized rules, set common standards, recommend best practices, suggest good procedures, provide technical assistance and build capacity of the member countries. Those need to be addressed in one comprehensive platform.

[15] Available at http://www.silkroadfund.com.cn/enweb/23775/23767/index.html

[16] Asian Development Bank Institute (ADBI) Working Paper 522 on Infrastructure Finance and Financial Sector Development (March 2015).

Except the road sector, other modes of transport are supported by their respective intergovernmental bodies. However, equivalent intergovernmental support to the road sector is very limited. What is missing in the road sector is strong intergovernmental support. This support is urgently needed so that the sector can continue to contribute to economic and social development while addressing challenges in a manner that is consistent with the Sustainable Development Goals.

The road sector has a few non-governmental organizations including the World Road Association (PIARC), the International Road Transport Union (IRU) and IRF. These organizations represent the interests of the road transport industry and provide technical advice to members in various areas including infrastructure, safety, environment and disaster management as well as education and training. IRU manages the private sector side of the functioning of TIR (Transports Internationaux Routiers or International Road Transports) Convention.

As a result, the road sector has a serious deficiency of standards/norms, regulatory frameworks, guidelines, associated technical assistance and capacity building. This institutional gap has caused many of the difficulties and challenges arising in the road sector which are directly related to the development of the Asian Highway network. In this aspect, there is an urgent need for an international road organization to provide comprehensive and integrated support for international road transport infrastructure development. This international organization could provide support to the international road networks including the Asian Highway network complementing the activities of the ESCAP secretariat.

5. Conclusions and Recommendations

Since the Asian Highway network was adopted in 2003, it has been playing a pivotal role in assisting member countries in improving intercountry and interregional transport links. In a survey conducted by the secretariat in June 2017, five of the 14 responding Asian Highway member countries reported that good progress had been achieved in terms of quality of the road infrastructure. During the period 2008-2017, about 6,732 km, i.e. 4.5 per cent of the network, could be upgraded to a higher Class of standards. However, the latest 2017 updates show that to date about 9,176 km, i.e.7.25 per cent, of the network do not yet meet the minimum desirable standards. To implement the Asian Highway design standards as stipulated in the Annex II to the Intergovernmental Agreement on the Asian Highway network, member countries encounter several challenges. Lack of funding is the most critical challenge encountered by the member countries. Moreover, lack of awareness as well as lack of planning and coordination also hinder the development of the routes and implementation of the Asian Highway design standards.

To promote and facilitate implementation of the Asian Highway Design Standards[4], a set of initiatives are being recommended: a) building awareness about the Asian Highway network and the Asian Highway design standards, b) conducting analytical studies on the Asian Highway design standards to demonstrate the benefits of the adoption of the regional standards, c) strengthening collaboration with the development partners including enhanced cooperation with the United Nations Regional Commissions, d) updating and modernizing the Asian Highway design standards to incorporate new road safety standards as well as latest technologies, e) developing tourism along the Asian Highway to attract subregional as well as regional traffic, f) promoting financing for development of the Asian Highway network, f) supporting establishment of an intergovernmental international road organization having one of the mandates to work with the ESCAP secretariat to promote the Asian Highway network.