Abstract: In the past, beginning with Seoul-Pusan highway, Korea has invested in the increase of road extensions. So it has prolonged by three times. However, in comparison, railways have increased only about 30% and thus, total length is approximately 3900 km. The problem with Korea's intercity transport system can be seen as the increase of logistic costs, cost of traffic congestion, traffic accident related costs and lack of investment efficiency. The fact that we have less land and stock compared to other similar countries also proves to be a problem. The government focus of transport is being converted to a transport and logistics based direction of policy. It is important we do not stop at increasing our investments in railways but specifically research the measures which other countries are taking to confront such climate changes and work towards increasing and consistently developing the development of low carbon green growth.

Key words: Intercity Transport System, KTX, Road, Ulsan station.

1. INTRODUCTION

Korea, which is located at the very east of the Asian continent, has an area of 100,210㎢ and the capital city is Seoul. The area in question consists of 1 metropolitan, 6 cities and 9 roads.

The population of Korea after the Korean War in the 1960’s was approximately 25 million people. However, in 2010, the population nearly doubled to 49 million people. Out of the
entire population, the population in the Seoul and Gyung-gi area increased by more than four times the original population. Thus populating nearly half the entire nation and showing a noticeable trend of population concentration phenomenon.

In 1985, when the statistical analysis began, the GDRP increased from approximately 89 trillion won to 1028 trillion won in 2008. The Seoul and Gyung-gi area took up approximately 43% of the entire GRDP, showing a concentrated trend similar to that observed in the population of the nation.

Figure 1 shows that the number of cars rapidly increased after 1980. The number of cars was approximately 32,000 in 1963. This number rapidly increased, and as a result, between 1995 and 2000, the number of cars exceeded 10 million. Currently, in 2009, the count is at approximately 17.3 million. The rate of cars, in 1963 was 30% but has now increased to approximately 75%.

Korea’s intercity traffic network construction, based on transport research, has been converting its direction from railway focused investments to road focused investments. At the time, president Park Chung-Hee, after coming across the Autobahn of Germany, realized the need and benefits of highways. Accordingly, in 1968, the construction of Seoul-Pusan Expressway began. In 1970, the finished Seoul-Pusan Expressway managed to reduce the time taken to travel from Seoul to Pusan from 15 hours to 4 hours. Following this, policies have been enforced to increase the efficiency of roads through the extensions of roads and connections made between roads and major distributing sites. Thus in the 90’s factors such as social equity and the development of land were considered and in the 21st century, investments are being made to connect railways and other means of transport to decrease the emission of harmful gases and thus contribute to being an environmentally friendly system of traffic.

2. THE CONSTRUCTION OF KOREA’S INTERCITY TRAFFIC SYSTEM
2.1. CHANGES IN TRANSPORTATION AND TRAFFIC SYSTEMS
Up until now, the extensions of roads have consistently increased with the investments into developing and improving roads. According to Figure 2, we can see that there was a significant increase in the extension of roads between the 1990’s and 2000. The total extensions of roads have increased to 1.05 million km; nearly 3 times what it was in 1960, when it was only approximately 350000km. Out of these, the largest increase in extensions can be found in local roads

Railway extensions, as seen in Figure 2, unlike the increase of extension of roads, have increased approximately 1000km. This is because in comparison to road extensions, there have been significantly lower investments in railway extensions. Up until now, the increased extensions of railways have usually been due to the opening of express railways in metropolitan and city areas in 2004. On the other hand, the extension for basic railways decreased due to the straightening out and modernization of railways.

There are 15 airports in Korea. 8 of these operate both national and international flights(Gimpo, Incheon, Gimhae, Jaeju, Daegu, Chungjoo, Moor, Yangyang etc.) the other 7 operate national flights only and are located in Ulsan, Gwangjoo, Yeosoo, Pohang, Sacheon, Goonsan and Wonjoo. Out of these, Incheon airport, which is run by Incheon International Airport Cooperation, is the only airport which acts as a gateway. Incheon airport is fitted with 3 airstrips and has the largest processing capacity out of all the national airports. The rest of the 14 airports are run by the Korean Airport Cooperation.

The demand for national airline was merely 1.48 million people in 1980. However, with the increase of population along with the improvement of lifestyle, in 2000, demand for airlines increased to over 22 million people. However, with the opening of KTX, airlines from Seoul to Daegu, Seoul to Pusan etc were converted from airline demand to demand for railway and in 2008; airlines have been maintaining demand levels at approximately 17 million people.

2.2. SERVICE STANDARDS
According to Figure 3, with the increase of travel distance, the railway and airline proportion sector also increases, whereas the share of cars and buses decrease. In moderate distances of up to 270km, there is a trend where cars maintain a similar rate, the rate of buses increases a little and the rate of railways decrease. In long distances exceeding 270km, the rate of buses and cars decrease and the rate of railways and airlines significantly increase. This phenomenon occurs due to the fact that the longer the travel distance, the more economically and timely efficient it is to travel by railway or plane. Railways, especially with the effect of the KTX trains, show a significant ratio of over 40% of the entire long distances exceeding 360km.

Figure 3 Methods of transport based on travel distance

Figure 4 shows the cost and consumption time of 5 main cities; Seoul, Daejun, Daegu, Pusan, Gwangjoo and Ulsan. Firstly, looking at the consumption time, all the means of transport except airlines show increases in proportion to travel distance. In the cases of buses and cars, as they usually have similar travel routes, they have similar consumption times when using expressways. Basic railways in Daegu, Daejun and Pusan generally have the same trend as buses and cars. However, Gwangju and Ulsan are seen to have longer travel times. Ulsan especially, as it takes 90 more minutes to travel compared to buses, shows a significant difference in time. In the case of KTX trains, the consumption times in comparison to general railways are approximately 37~67%. However, out of these, Ulsan has had the largest decrease in consumption time with the opening of KTX trains.

Cost also works in proportion to distance. However, it shows a different trend to that of consumption time. With the exception of the Seoul to Daegu interval, cars have the largest cost in all areas. On the other hand, buses, in all the intervals, are the most cost efficient method of transport out of the 5. Basic railways usually cost more than buses but are only 60%~70% of the cost of KTX trains.
3. PROBLEMS ASSOCIATED WITH INTERCITY TRANSPORT SYSTEMS

In Korea, social economic costs such as logistic costs and traffic congestion costs are still on the expensive side. In the case of Logistic costs, the gross national production is 12% (117 trillion won in 2007). This is a higher figure in comparison to that of America (9.5% in 2001) and Japan (9.6% in 1997). The traffic congestion costs fell to 2.65% (25 trillion won in 2007). However, it increased in 2008 to 2.95% and traffic accident costs, with a figure of 1.06%, were lower than America (1.85%) and Japan (1.31%) with a cost of 10 trillion 8135 million won in 2008. However, these figures were higher than that of the UK (0.75%).

In 1950, due to the war, the accumulation period of Koreas transport SOC was only 30~40 years. As a result, Korea has less stock in comparison to countries with similar land as Korea such as Greece, Sweden and England. In addition, it will prove to be difficult to finance transport SOC due to issues concerned with social welfare and financial increases such as the increase in financial spending and policy of transport taxes.

Due to the lack of transport SOC, although there are large efforts to increase the supply of transport facilities, there are problems associated with lacking efficiency and operation activity. This is because the distribution methods of transport investments lack efficiency and cohesiveness. Also, the reality is that there is no structures major city traffic demand maintenance system and thus there is a chronically repetitive policy in act.

As globalization continues to accelerate and work markets gradually integrate as one, Korea lacks professional companies in traffic logistics and lacks efficient global traffic logistic networks and thus traffic competition from a global perspective. In addition, with the gradual focus and concerns arising around global warming, it is crucial that Korea confronts their energy consumption rates and emission of CO2 as they are still at a unfavorably high level.

4. CHANGES RELATED TO THE ESTABLISHMENT OF ULSAN KTX

With the opening of highways, the accessibility improvements have both direct and indirect
influences upon the area in question. As there are usually both positive and negative affects which work together, it is important to understand the potential of this area and devise a plan which can maximize such potential. Just as the area of Stage 1 of KTX in 2004 from Seoul to Daegu brought many changes, the new Stage 2 KTX at Ulsan station can anticipate many changes also.

Looking at the industrial economic area of the opening of Stage 2 KTX, the west side of Ulsan situates Ulsan High Tech Valley and industrial bases such as Gilcheon Local Industrial Agency as well as Ulsan Science Technology University. An additional increase I businesses can be expected with the input of R&D research institutes related to basic industries and innovative industries.

Following this, the area of medical attention from the aspect of service is also looked at. Looking at the past opening of Stage 1 KTX, the use of hospitals in Seoul from Daegu, Pusan and Ulsan etc increased by approximately 30~45%. Although a Straw Effect can be expected from Seoul and major cities, the demand for medical attention can be seen as a factor which has no relation to the opening of KTX but merely a general form of consumption. As a result, it is difficult to directly associate such factors with the opening of KTX. Thus, specific analysis of the demand for medical attention before and after the opening of Ulsan KTX is needed.

Secondly, as tourism is the factor which holds the most potential for benefits to Ulsan, in the short-run, a program which can connect the Ulsan tourism resources with the west side of Ulsan is needed. With the opening of KTX, although the number of tourists in the area of question increased, in the case of opening Stage 1 KTX in Daegu, the number of tourists decreased. This shows the need for publicity of the area in relation to the area’s specialized tourism resources. It is expected that the users of Yougnam Alps will increase from about 1.52 million to about 2.1 million with the opening of KTX at Ulsan.

In the area of mobilization and shopping, with the increase of floating population, the increase of Straw Effects in partial major city wholesale and retail businesses occurs. However, the effects of such increases aren’t expected to be very significant. The reason for this is because it has a logistic distance of within 2 hours and the advancement and popularization of the distributors of districts has taken place. However, in order to in order to maximize the opening effect of KTX, there needs to be the construction of stations which can connect the tourism resources from the west to the complex distribution facilities. Taking Chuncheon as an example, after the opening of the expressway from Seoul to Chuncheon, the sales at department of stores in Chuncheon increased significantly in comparison to sales at department stores in Seoul. This phenomenon seemed to occur because the department stores in Chuncheon showed characteristics and effects of tourism resources.

Studying aspects of transport systems, it is seen that the actual customer demand for Ulsan station on the KTX was 241995 people (on average 8,641 a day), thus greatly exceeding the expected demand. This resulted in problems such as narrow areas and shortage of parking spaces. On the other hand, the demand for airlines, compared to before the opening, decreased 34% in users from 2,856 to 1,890 people. The average boarding frequency decreased by 18% from 71.4% to 18%. However, as the KTX Ulsan Station is to be located outside the city, and Ulsan airport close to the intercity, it can be assumed that the decrease of airport demand wont decrease like other cities due to demand from other areas. Consequently, there is a need to maintain the transport system of Gwangyuk so that the KTX and airport do not become a zero
island game due to competition, but function to fulfill their purpose as complementary facilities.

Looking at the migration of population, it has no relation to the opening of KTX but migration in Seoul and Pusan seems to be the result of problems concerned with education and quality of residence in Ulsan. Although this trend may continue, with the establishment of specialized education systems and luxury townhouses, there is a possibility of incoming population to such cities. As a result, demand for city residence can be expecting with the input of KTX Ulsan and its new facilities.

5. INTERCITY TRANSPORT SYSTEM MOVEMENT

With the increase of regulations to control greenhouse gases such as CO2, Korea also is establishing policies which focus on being environmentally friendly such as low carbon green growth projects. Thus, using the key part of such policies, the government is converting the policy direction to the focus of traffic and logistics of railways through the expansion of high speed rails and the acceleration for current rails. Through this, effects which confront climate change and at the same time expand the land to a large easement in where synergy can be promoted and organic links can be made within industries.

![Figure 5 Present and Future comparison of travel time in each district of Korea](image)

With the establishment of a railway focused transport system, instead of the free movement of human resources and materials, the selection field of areas for industries and businesses will become nationally expanded. It can be expected that areas within 1 hour and 30 minutes of travel will be expanded to 84% of the population and 82% of the country. This means increasing the transportation of freight and passenger carrying methods of transport. As a result, increasing social benefit and naturally promoting the low carbon green growth project to confront the Greenhouse Effect.

6. CONCLUSION AND FUTURE PROSPECTS.
Up until now, the direction on intercity traffic policies have invested in road based quantitative increases such as the increase of extensions. As a result, not enough attention was paid to factors concerning the environment such as the emissions on roads and such qualitative factors on the road. Recently, by converting the transport policy direction to focus on railways, the qualitative development is contributing to a solution to confront the endangered environment. We must not only stop at increasing our investments in railways but specifically research the measures which other countries are taking to confront such climate changes and work towards increasing and consistently developing the development of low carbon green growth.

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