Modernization of Trunk Highway System in Western Norway

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The road standard and travel conditions on the existing trunk highway system along the coast of western Norway (Route 1) are described. The route traverses many fjords and is frequently broken by ferry crossings, nine in all. A low geometric standard and many ferries mean that the travel standard of the route is a major hindrance to economic development, especially in the rural districts of western Norway. The Coastal Trunk Road Committee, in which the author participates, has conducted comprehensive research on various aspects of the highway system. This work has so far resulted in a joint report on Route 1 through six counties, the purpose of which is to introduce a uniform, long-term strategy for construction standards, financing, and a work schedule for the route. The Public Roads Administration in these six counties and five different research institutions in Norway have cooperated in the making of this report. The participating research institutions are the University of Bergen, the Institute of Transport Economics in Oslo, and three other research institutions in western Norway. This paper describes the effect that a modernization of the route will have on the employment, demography, and economic development of rural communities.

Norway forms the western part of the Scandinavian peninsula, covering about 40 percent. It has an area of 324 219 km^2 and a population of 4.3 million. The country is the fifth largest in Europe, whereas, the population density is the next-lowest after Iceland's, 13 inhabitants per square kilometer as shown in Figure 1.

Norway is in the northern part of Europe and has the most inconvenient shape. It is 1752 km long, its narrowest point is only 6 km wide, and its broadest point 430 km wide. In the east the country borders on Sweden, Finland, and Russia. Otherwise, Norway has the sea as its boundary, with an exceptionally long coastline (26 000 km).

Four-fifths of Norway is more than 150 m above sea level; the average height above sea level is 500 m. Oslo, the capital, lies at about 60 degrees north latitude, which passes north of Scotland and through central Canada and southern Alaska. Norway's northern most town, Hammerfest, is also the most northerly in the world, above 70 degrees north latitude.

Western Norway, in the southwestern part of the country, borders the North Sea and the Norwegian Sea. This region is characterized by fjords and mountains. The topography makes it extremely difficult and expensive to build roads here, especially in a south-north direction across the fjords and over the mountains. Historically transportation in the region has been by sea.

The demand for new flexible transportation solutions means that sea transportation alone is no longer adequate. In addition, western Norway lacks a north-south railway system to tie it together. This is yet another reason for developing a good trunk road system through the region.

FIGURE 1 Population density in Europe (● = 0.5 million persons).

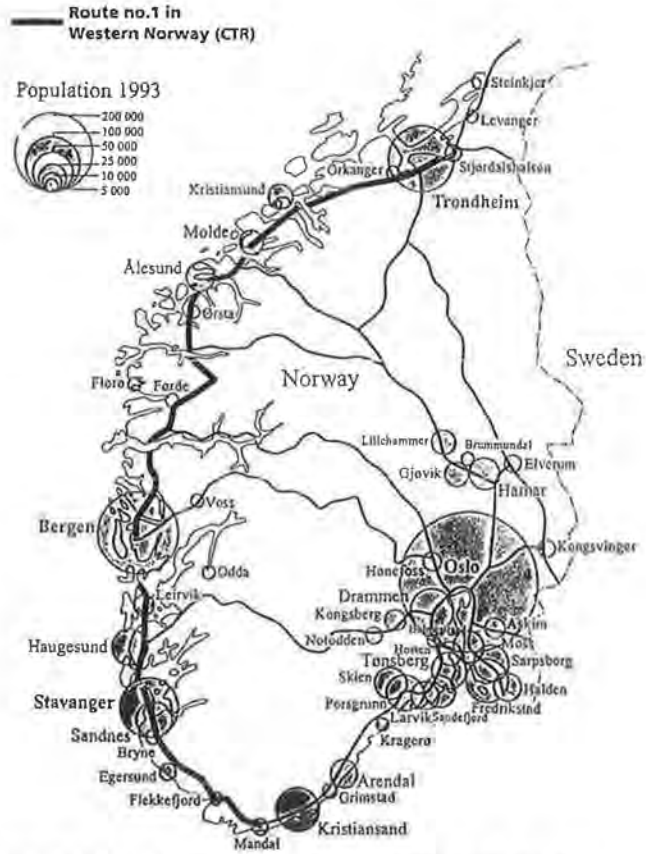

FIGURE 2 Norwegian trunk road system and urban centers with population over 5,000 (southern Norway).

Because of Norway's low population compared with its area, practically all roads in Norway are low-volume roads. Most parts of Norway's national highway system consist of one- or two-lane roads. Average daily traffic on these roads is between about 1,000 and 5,000 vehicles.

The traffic volume on highways in western Norway is lower than in other parts of the country. One reason for this is the generally lower standard and the lack of a satisfactory and efficient south-north trunk road running through the region. Another reason for the low volume of traffic is the number of ferries in this region. This problem will be discussed later.

Figure 2 shows the national trunk highway system connecting urban centers in southern Norway. Almost every trunk road radiates from the capital region and only a few roads are interregional, a system Norway probably shares with many other countries.

Coastal Trunk Highway

As shown in Figure 2, the Coastal Trunk Road (CTR), Route 1, goes from Kristiansand in the south to Trondheim in the north. The route is about 1000 km long. Today it is broken by nine ferry crossings across as many fjords. Between these fjords, Route 1 passes through rugged mountain country. On many stretches the highway has a low standard, with steep gradients, single-lane passages, and sharp curves.

Despite its low standard, Route 1 is one of the most heavily traveled roads in the country, especially around the cities and the major semiurban areas. Nevertheless, a study (*1*) shows that far fewer people travel the roads of western Norway than would be expected on the basis of population, demographics and the economy.

Air travel dominates much more in this part of the country than it does in the rest of the country for equivalent distances. This fact is a sure sign of an inadequate infrastructure for land transportation.

A research report (*2*) shows that a better CTR system will lead to more efficient transportation in the region. Although small quantities of freight will be transferred from sea to road transportation, total sea and road transportation requirements on a national basis will be reduced by 5 to 6 percent.

An efficient Route 1 will lead to a better distribution network for terminals catering to sea, rail, and air

transport (*3*). Regular services will be faster and more frequent, and the various methods of transportation will complement each other far better than they do today.

Route 1 passes through beautiful scenery giving tourists a pleasant journey, interrupted by boat rides on modern ferries. Unfortunately, this journey can be quite time consuming. Depending on ferry schedules, the minimum journey from Kristiansand to Trondheim will take about 30 hr, giving an average travel speed of 33 km/hr.

One-third of Norway's population (*4*), 1.4 million people, live in the influence area of this route, which traverses 15 big and small communities and towns, including four of Norway's five largest cities: Bergen, Trondheim, Stavanger, and Kristiansand, as shown in Figure 2.

Figure 2 also shows the urban center pattern in southern Norway. Approximately 20 urban centers (with at least 5,000 inhabitants each) line Route 1. From 1960 to 1990, the population in these centers increased from 650,000 to 1 million (*4*). During the same period, the population in the rural areas decreased from 565,000 to 484,000. The total population of western Norway, however, increased 49 percent (from 1 million to 1.49 million) from 1960 to 1990. As seen in Figure 1, 90 percent of the people of western Norway live near the coastline in the area through which Route 1 passes.

About 75 percent of all exports from Norway, including oil and gas, comes from the western region (*5*). The region is rich in fisheries and dominates Norway's fish-farming industry. Tourism is a fast-growing industry in Norway, and western Norway with its fjords and mountains attracts many tourists. Most of Norway's oil industry, both onshore and offshore, is found in this region. In addition, a surplus of hydroelectric energy supports a large aluminum and electrochemical industry and many small industries spread throughout small communities. Western Norway is the country's richest region in natural resources. It is also one of Europe's richest regions.

Some years ago, the six counties through which Route 1 (CTR) runs formed a political-administrative committee. The committee's aim is to further the improvement of Route 1 and eventually make it continuous and free of ferries.

One of the committee's short-term goals is to establish a satisfactory standard of service on the existing ferries in terms of cost, capacity, frequency, travel time, and comfort. A second goal is to eliminate all but the six longest ferry crossings and to improve the quality of service of the remaining six. A third important goal is to improve the quality of roads between the remaining ferries.

Financing

People in the western region are used to paying for their transportation. Ferry fees are very high. Travelers pay a total of approximately $100 billion annually in fees. Yet, most ferries run only during the daytime and seldom more often than once an hour.

The committee realizes that the ideal situation would be a connection from Kristiansand to Trondheim completely free of ferries (*2,6*). However, it is also aware of the high construction costs in relation to a relatively low volume of traffic. These costs would amount to about $1 billion if six ferries are kept, whereas a completely ferry-free CTR would cost about $2.5 billion. The committee's studies show that toll money can meet less than 50 percent of the necessary investment. The rest must come from state grants, which most likely means it will take from 20 to 30 years before the ultimate goal of a ferry-free CTR can be reached.

Nevertheless, all big fjord-crossing projects on Route 1 thus far have been built with large portions of toll money. This method of financing will also be used in future projects.

Effects on Employment, Settlement, and Economy

Mostly because of its inadequate infrastructure, western Norway has never been an integrated region as to economy, culture, or social life. The region is, on the contrary, divided into many small and isolated communities. These small communities often have a one-sided economy and depend on only one kind of industry (*7,8*). The social, cultural, and political contact among these communities is much less than expected considering the real distances between them.

From 1970 to the present, employment has been increasingly concentrated in cities and other semiurban areas. In the 1980s, private car ownership and generally improved communications, which had prevented similar demographic centralization, made possible increased commuting to central areas. In the long run, it is not possible to prevent rural and more peripheral districts from being affected by this centralizing tendency (*4,9*).

Communications have an obvious impact on regional development. Research institutions that have participated in the report work on Route 1 have concluded that a better highway system will strengthen the economy and help to maintain the demographic pattern in the region.

In 1990 there were 47 rural townships with a total population of 205,000 that were not integrated into a central employment area; that is, they had commuter frequency lower than 15 percent (*9*). A modernized

trunk highway system would lead to the integration of at least 30 of these townships by 2010 when it is expected that at least 40,000 (19 percent) in these 47 rural townships will depend on earning their income from a central area. If high travel costs or other reasons prevent these employees from commuting, a further decline in the rural population will result (*4*).

Studies have concluded that with a more efficient CTR, certain regions will have an increase of 7 to 8 percent in their population over a period of 20 years (*9*). In many regions this increase will mean the difference between decline and growth in the population. This is mainly the case for places gaining reduced commuting distance to centralized employment markets. Therefore, a reduction in travel time from more than 1 hr to less than 1 hour can make a considerable difference.

Until recently one of the main goals of the Norwegian government has been to maintain the rural population, and the government's policy on road building and transport infrastructure has been to this effect. Lately, the focus of the government's political interest has moved from the concerns of districts and rural areas to environmental problems in and around big cities. One result of this changed policy is, of course, a decline in the rural population.

With an increased emphasis on overseas trade, western Norway has become an important center of activity for the country's economic development. With a more efficient highway system, large portions of western Norway could export goods much more quickly (*5*).

Conclusion

A high-standard trunk highway system in western Norway with the fewest possible number of ferries would contribute to a better regional and national economy. It is also an important factor for maintaining a rural population. Good communications improve the job market and the possibility for commuting from rural areas. It also makes it more lucrative for industry to set up business in the outlying areas.

The work by the CTR committee has resulted in a report from the Department of Transport to the Norwegian Parliament. It is hoped that Parliament will discuss this report in the 1995 session. The report discusses the national strategy for further development of the CTR. Discussion of this issue will be a great inspiration for the local political committee that has worked for many years for just this political goal.

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