

Jukka Isotalo

Development of Good Governance in Road Sector in Finland

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Finnish National
Road Administration

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ABSTRACT

The development of the performance of the Finnish road sector is discussed using the Finnish National Road Administration, FinnRA, as the main example. The author also takes examples from the municipal street and road management and the privately managed low-volume roads.

There are plans under way to reform the organization of FinnRA for the fourth time within a period of seven years. In the 1960s and 1970s, FinnRA underwent two other major organizational reforms. All the reforms aimed at improved economy and efficiency in road management in Finland.

The aim of the first two organizational reforms was to improve the organizational capacity to accomplish the increasing number of duties with limited financial resources. The organizational reforms were accompanied by technical and managerial developments. These included the introduction of an integrated computerized information and management system at the end of the 1960s. The managerial personnel were trained to use the contemporary, internationally developed management systems. These included such techniques as management by objectives and result management. Result agreements are now used when assigning tasks to subordinate units.

FinnRA pioneered in proposing and testing new budgetary and financial reforms. Later, FinnRA became one of the first Government agencies to use a bonus salary system for all of its employees. FinnRA was also a pioneer of the public administration in using a performance budgeting system and in preparing a company type financial statement and balance sheet.

The use of an integrated management information system, and management training at all managerial levels, paved way for the delegation of authority to the provincial and local levels to use resources and administrative power. The provincial level Road Districts and their subordinate sites and maintenance area offices were thus encouraged to produce better results. This also included an improved use of FinnRA's own equipment. The management information systems, together with performance and fiscal auditing, have effectively prevented any misuse of funds or the delegated authority.

The system development made it possible to improve performance evaluation. Initially performance evaluation had several internal competitive elements. Further development led to the use of new quality management systems and the assessment of FinnRA's performance in comparison with its counterparts in the private sector.

FOREWORD

The purpose of public organizations is to serve the people, their customers. Within time, however, administrations tend to loose their grip on the core purpose of their existence, while administration per se becomes their main purpose. The fundamental issues of the purpose of an organization and its goals are seldom discussed during a period of peaceful development and evolution. The economic recession of Finland in the early 1990s gave a strong impetus to a discussion of the fundamental principles of the public organizations, the Finnish National Road Administration, FinnRA, included. Recent history has involved a number of minor crises, starting from the first global oil crisis, which have all given strong developmental stimuli to FinnRA. Many of FinnRA's reforms have been initiated from the inside. Its engineering staff have been pioneers in technology and productivity development of the Finnish government service. FinnRA's management have realized that only the leaders can manage in the struggle for survival, and that FinnRA has to take the lead in its own hands. And what is even more, FinnRA has learned to listen to its customers, the road users, and to serve their needs.

This paper gives an overview on the steps of development in FinnRA's search for good governance. For this reason the author has compiled some of the landmarks of the different phases of development.

- (I) A search for cost effectiveness has played an important role in an organization with limited resources. For this purpose, the development has included improvements in planning and management, an increased use of contractors, consultants and other outside services, a development of internal benchmarking, a development of cost-quality consciousness and, most recently, organizational developments towards an internal differentiation into customers and producers.
- (II) In order to improve efficiency and customer service, FinnRA's organization has been undergoing a continuous change. This has meant a delegation of power and authority to the lowest possible level, where the operational decisions are made and the communication with the customers takes place. A long lasting goal has been the reduction of administrative and overhead costs.
- (III) The organizational and managerial developments have been supported by intensive system development to provide all levels of management with good and reliable information. The entire managerial culture and the processes of management have been modified to support the new goals of the organization.
- (IV) The opinions of road users are being increasingly considered by FinnRA's management. Road user information in different forms is part of the current daily practice.
- (V) Traffic safety has been of great importance in FinnRA's activities for

two decades. The maintenance of traffic safety has involved good cooperation with the municipal sector and the traffic police.

- (VI) Parallel to the above, the process of auditing has been directed away from a search for mistakes and administrative failures towards auditing the processes and finding out how they serve the predefined goals. The delegation of authority has brought about a need to ensure that the delegated power is not misused.
- (VII) FinnRA has developed its environmental impact assessment to meet the environmental requirements. Much of the research efforts are aimed at developing environmentally sound working methods, especially for winter maintenance, noise and dust abatement and ground water protection.

The road users expect the road administration to guarantee a reliable, smooth and safe way to travel from their starting point to their final destination. High speed is not a necessity for all road users. FinnRA is, in practice, providing reasonable road conditions all over the network for 24 hours a day throughout the year. The needs of heavy-load trucks, cars and non-motorized travellers differ from each other. Additional needs include reliable information on the traffic conditions and sufficient roadside services.

A tax-payer would like to have reasonable public services with a minimum tax burden. He/she would like the tax money to be used in a cost-effective, environmentally sustainable way. Some tax-payers may wish to see their tax money go to domestic contractors using domestic equipment. FinnRA has considered it important to identify its clients and the services they are willing to pay for.

The development of a large conglomerate like FinnRA is an extensive and multi-factorial process. The presentation of only a few sectors would not give an adequate idea of the complexity of road management development. Therefore, the author has selected nine different sectors for closer consideration, including some background history for the developmental perspective. In addition to this, the first two chapters give an overview of the road sector and road management in Finland. Some developments have been slow, most notably the change of the policy in works execution. Fast developments have been accomplished in areas under the direct control of FinnRA's management, such as system and technology development.

FinnRA is facing many challenges and risks in today's turbulent environment. Political pressure to downsize administration and to increase privatization in the operations requires good contacts with the political decision-makers. Environmentally active movements opposing traffic and economic growth question FinnRA's principles of development. FinnRA has bravely decentralized its operations and delegated administrative power. The success of this effort

will depend on the confidence and competence of its staff. The management and accounting systems are sophisticated, complicated and vulnerable. The reduction of administration and information at one point may affect vital systems at another point. The bankruptcy of a maintenance contractor during a mid-winter snow storm may be a risk to a local community. Public awareness has increased the planning time-spans and, for example, complicated road project approvals and the procurement of stone material.

The Author

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1 OVERVIEW OF THE ROAD SECTOR IN FINLAND

Roads and Traffic in Finland
Development of the Public Road Network
Classification of Roads
Road Sector Personnel

1.1 Roads and Traffic in Finland

Finland is a northern country with a population of 5 million people and a land area of 338 000 sq.km. A nation-wide passenger transport survey reveals that Finns make an average of 3 trips a day and use one hour and 17 minutes to do so. The distance travelled per day is 51 kilometers per person, giving an annual traffic performance of 42.4 billion automobile kilometers. 93% of passenger traffic and 66% of goods transportation take place on roads.

Number of automobiles	2.2 million	Total length of road network	370 000 km
Number of cars	1.9 million	Public roads; of which	77 500 km
Automobiles / 1000 inhabitants	446	•Paved roads, 62 % of network	48 200 km
Accidents, per annum; fatal	483 persons	•With bicycle and pedestrian routes	3 200 km
Accidents, per annum; injured	10 000 persons	•Illuminated roads	9 000 km
Fatalities/10000 inhabitants	1	•Motorways	318 km
Passenger traffic on roads	59.3 billion person-km	Municipal streets and roads	24 500 km
Goods transport on roads	24.7 billion ton-km	Other roads, cooperative roads forest roads etc.	280 000 km

The currency conversion rate used in this report is 1 USD=5.3 FIM

Finland is a republic. Its multi-party Parliament is the highest legislative body, which also approves the Government's annual budget. The Cabinet (the Finnish name is State Council) is usually formed as a coalition of several parties. A number of Ministries administer the various public sectors. Under each Ministry, administrations and public enterprises (parastatals) administer their operative areas. Finland is not a federation. Public administrations have Provincial (regional) and local level organizations. Municipalities are strongly protected by the Constitution. They have their own politically elected councils and cabinets, their own taxation and strong power in land use planning. The acronym FinnRA will be used in this paper to refer to all FinnRA's predecessors as well. FinnRA's history dates back to the year 1799. The provincial road organizations of FinnRA will be called districts in this paper. The districts have design offices, construction sites and road maintenance areas (zones) with small offices as the local level organizations of FinnRA.

1.2 Development of the Public Road Network.

The following table shows the rapid increase of motorization and the changes in the road network in Finland.

Year	FinnRA's roads km	Village roads km	Total public roads km	Vehicles; Automobiles and motorcycles	Cooperative roads, with Government support km
1960	39 700	29 000	68 700	360 000	nil
1970	72 400	nil	72 400	872 000	26 000
1992	77 000	nil	77 000	2 200 000	59 000

The length of municipal roads and streets has more than doubled from the mid-1970s to the end of the 1980s, its present length being 24 500 km. Additionally, 28 000 km of cooperative roads receive municipal support and some roads are given both Government and municipal support.

The cost of managing and maintaining roads of different ownerships varies a great deal. Cooperative (private) roads are the cheapest per kilometer, while FinnRA's roads are the cheapest per vehicle kilometer, as the average traffic on cooperative roads is no more than 45 vehicles per day.

Cost of road maintenance and operation:

- FinnRA's roads 6110 USD/km (1.6 US cents/vehicle km)
- Municipal streets and roads 13200 USD/km
- Cooperative roads 770 USD/km (4.7 cents/vehicle km)

Box 1.

In the early 1960's, the Finnish Government commissioned an international engineering company to prepare a ten-year plan for the development of the Finnish road sector. In its final report, the company (NEDECO, Netherlands, 1966) recommended, inter alia, a restriction of the road network to the main highways and a discontinuation of the practice of using road works as an instrument to reduce unemployment. For political reasons, neither of the two recommendations materialized.

For maintenance purposes, the network length gave an opportunity to FinnRA to mechanize maintenance operations and the large quantities of equipment purchases gave scale advantages in unit prices. The growth of national wealth paved the way for a sufficient financing of the maintenance of the total road network. In a stagnant economic situation, the great length of the network might have been an economic disaster for FinnRA. Road works remained one of the Government's main tools for unemployment reduction until the late 1980s, and have been that again during the present recession.

1.3 Classification and Condition of Roads

Public roads in Finland are managed by the **Finnish National Road Administration (FinnRA)**, a governmental agency subordinate to the **Ministry of Transport and Communications**. The roads are *administratively classified* into four classes:

- (a) main national highways (7 500 km),
- (b) secondary national highways (4 100 km),
- (c) other highways (30 100 km) and
- (d) local roads (35 800 km).

Until this year the municipalities have allocated a modest percentage to the maintenance costs of the local roads located within their borders. The administrative classification reflects the substance of the Act on Public Roads.

For maintenance, design and managerial purposes FinnRA also has the following *functional classification* of the public roads:

- (a) main national highways (8 620 km),
- (b) secondary national highways (4 710 km),
- (c) regional highways (13 530 km) and
- (d) connecting roads (50 640 km).

The main national highways connect the national capital to the provincial capitals and the main border crossings. The secondary national highways connect other major cities to the national highway grid. The by-passes of the three major cities have a secondary national highway status. The regional highways connect the remaining major municipal centers to the national highway network, while the connecting roads connect the villages to the main road network.

The highway design and maintenance standards as well as the road signs and numbers are influenced by the classification of highways. The higher the road class, the higher the design speed and the design standard that will be applied. The design traffic determines the width of the highway. The number of heavy vehicles and subsoil quality are the main factors in structural design. Both the highway class and the traffic volume influence the maintenance standard to be applied, as will be presented in more detail in chapter 11 and the reports referred to therein. All the Finnish highways are paved, mainly with hot mix asphalt. Half of the connecting roads are paved with cold mix asphalt or a bituminous surface dressing. 29 000 km of the public roads in Finland have a gravel surface.

The surface quality of the public road network is, in general, very good. The IRI roughness measurement of the main roads in 1993 showed 38% of the main highways to be in an excellent condition, 53% in a good condition and 9% in a satisfactory condition. No main highways have poor roughness. Good driving conditions also prevail on the lower class roads. The general width of the highways and some other technical standard features may not be as adequate as the surface quality.

The **municipalities** are responsible of the streets and roads in their built-up areas, meant for both local and through traffic. The Finnish municipalities have to rely on general municipal taxation for their road sector financing. Parking fees are the only direct contribution by the road users to municipal road management, and they cover only a fraction of the expenses. The Finnish municipalities have no financial capacity to manage a longer road network, even if it would be feasible for technical reasons. The quality of streets, including their technical standard, varies greatly, depending on the size and financial capacity of each individual community. The Finnish municipalities have a joint central organization providing technical assistance and guidance to individual municipalities, including the technical offices responsible of roads.

The category "other roads" is mainly composed of forestry and other private roads within individual properties. An important group is made up by cooperative roads. The roads used by a number of land owners are maintained as cooperatives under the Act on Private Roads, as will be presented in more detail in Chapter 2.

1.4 Road Sector Personnel

The staff of the **Ministry of Transport and Communications** currently includes about 160 persons.

The following table summarizes FinnRA's personnel in 1993.

Type of staff	HQ and Service Units	Provincial Road Organizations (Districts)	Total
Management	21	80	101
Production; Managerial staff	53	1876	1929
Production; Support staff	175	346	521
Administrative Staff	274	1806	2080
Laborers and Temporary Staff	-	4861	4861
Total	523	8969	9492

1480 persons of the district staff work in the provincial headquarters. It can be roughly estimated that 10 % of the district staff work in managerial/administrative/programming assignments, 10 % in planning/design assignments, 35 % in road and bridge construction, including project management and control, and 45 % in maintenance, most of them in actual works execution. The actual auditing involves a few staff members in each district. In 1993, the main reason for leaving FinnRA's employment was retirement (totally 342 persons). Only eight (8) persons chose another employer in 1993. The average age of FinnRA's staff is 46 years. This figure is much higher than the average employment age in Finland.

FinnRA contracted the following number of persons in 1993. The figures are calculated in staff-years.

- Contractors' staff	2052 persons
- Consultants' staff	402 persons
- Self-employed equipment and truck operators	1135 persons

In addition, the Ministry of Employment assigned 766 unemployed persons to work in FinnRA in 1993.

The following list indicates the academic qualifications of FinnRA's staff:

- M.Sc. in Civil or Mechanical Engineering	270 persons
- B.Sc. in Civil or Mechanical Engineering	311 persons
- Other academic degrees	171 persons
- Technicians with 3 years of Technical College	1560 persons

There are 455 municipalities in Finland. They employ permanently about 2700 workers in their public works departments, which are responsible for road and street works, and in some municipalities also for waste management, sewage treatment and parks. M. Sc. civil engineers employed by municipalities number over 600, B. Sc. civil engineers 1200 and building technicians over 2000. However, most of the above municipal technical staff are assigned to building works, not to the road sector. The variable sizes of the municipalities and the unavailability of accurate information make it impossible to present any more precise statistics concerning municipal road sector employees.

Before the current recession, the municipalities actively contracted out street construction and maintenance works and used consultants for various planning and design assignments. In order to avoid staff layoffs, the municipalities have lately reduced the use of external services.

Box 2.

One of the 455 municipalities in Finland is Nurmo, located in the mid-western part of Finland. Its population is 9 500 and land area 347 km². There are 123 km of public roads within the municipal borders. The length of the streets and roads maintained by the municipality itself is 55 km. Only one laborer is devoting half of his time to the maintenance of the streets and roads, his remaining time being devoted to parks, lighting and sewage works. Considering the working hours of the municipal engineer, the foremen and the office staff, the total time devoted to street and road management in Nurmo equals to two man years. Nurmo has, in practice, no municipally owned road maintenance equipment. All street maintenance, rehabilitation and construction is performed by contractors worth an annual sum of USD 300 000. Nurmo is providing some financial support to the cooperative roads within its territory.

There are no permanent employees for the cooperative roads, and even less for the private roads within property limits. Their management and operation are conducted on an ad hoc basis by the members of the cooperatives.

The Finnish public sector employees have been reasonably competitive in their remuneration. During the peak growth period in Finland at the end of the 1980s, the people in all the salary groups under 2000 USD/month earned at least the same in public service as in private companies. At the same time, the municipalities paid slightly better salaries than the government agencies. For young, graduated engineers the government salaries were equally good as the private sector salaries.

At the higher managerial levels, in senior positions and especially in civil engineering professions, there was a notable difference in favor of the private sector. Construction companies paid good salaries using bonus systems. The Finnish Civil Engineering Association survey revealed up to 40 % differences in favor of the private sector in senior managerial posts. For a roughly similar job, a governmental mid-level manager would earn 5000 US\$/month, compared to his/her counterpart's 7000 US\$/month in the private sector. For an average engineering assignment, the terms of employment in the private sector, Government employment and municipal employment are very close to each other. The higher earnings in construction industry are often based on salary bonuses. The private sector is more flexible in providing company cars and other non-salaried benefits. The shorter weekly working period of the public sector has now been almost eliminated. The public sector staff still have longer annual leaves. However, computer specialists and system analysts were the only professions in which the Government had problems to retain their staff.

The present recession has substantially levelled out the salary differences and especially the income differences between the private and public sectors in Finland. However, lower level jobs (laborers and support staff) are still reasonably well paid in the public sector, while the managers suffer compared to their colleagues in the private sector.

2 MANAGEMENT OF ROADS IN FINLAND

Ministry of Transport and Communications
Finnish National Road Administration, FinnRA
Municipal Road Management
Private (Cooperative) Roads

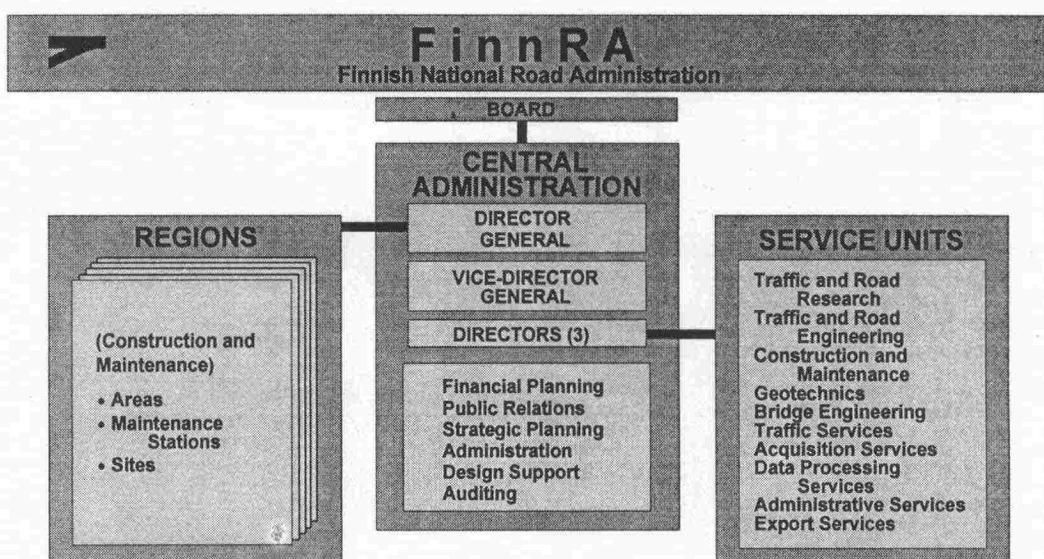
2.1 Ministry of Transport and Communications

The Ministry of Transport and Communications in Finland is responsible for the transport sector policy formulation, the coordination of the sector, and the management of transports through its public agencies (e.g. FinnRA), parastatals (the Finnish Railways and Civil Aviation Authority) and Government-owned

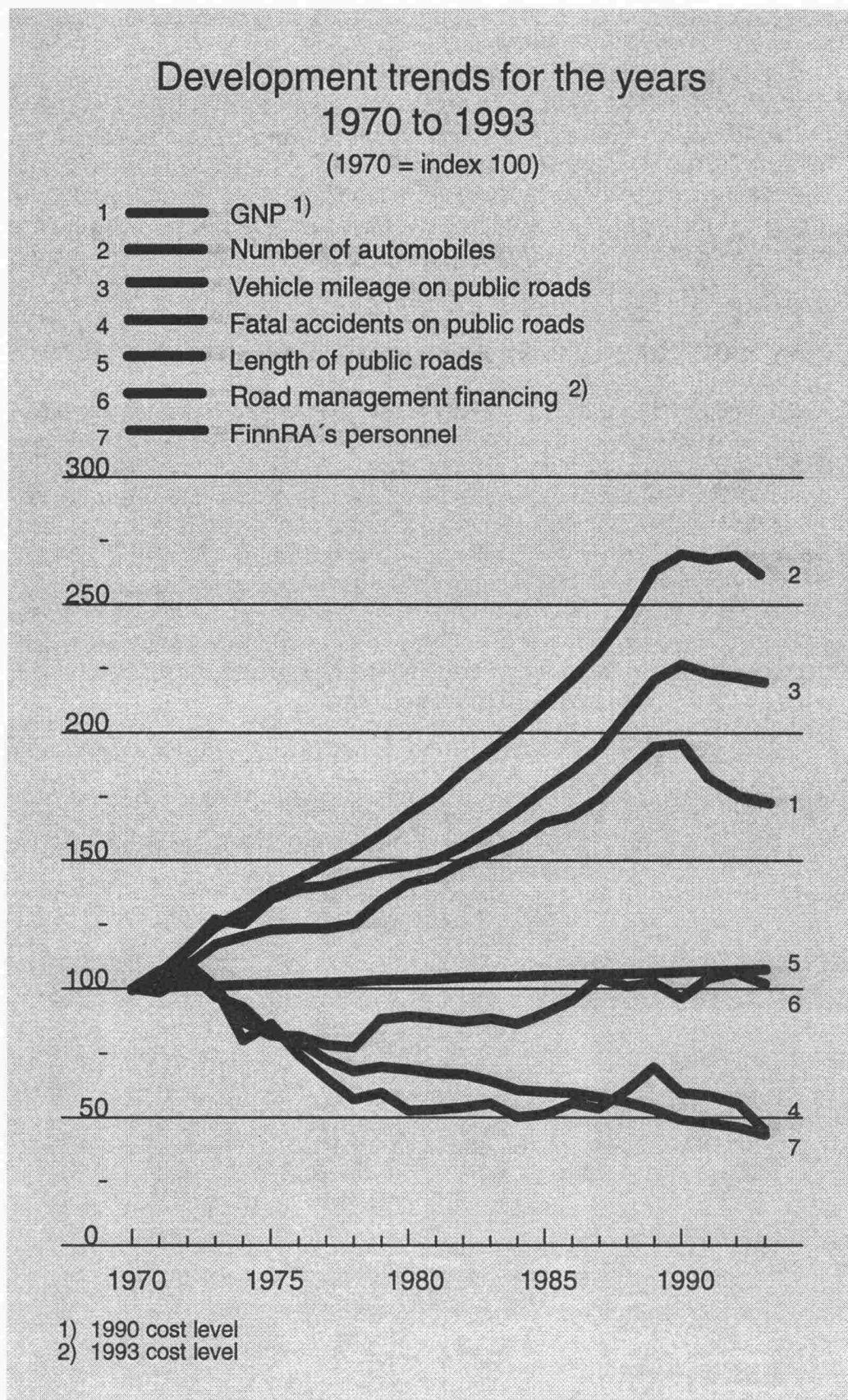
enterprises (Vehicle Inspection, Telecom etc). On behalf of the Government, the Ministry of Transport and Communications acts as the owner (and customer) of FinnRA. FinnRA's result targets are agreed on jointly by the Ministry and FinnRA and printed in the Government's annual budget. The Parliament decides on major individual projects for the development of the road network. The Ministry approves their final plans for execution and land expropriation. The basic road management services and minor works are executed by FinnRA based on the result targets, which will be described more closely in chapter 4. One of the members of the Board of FinnRA is from the Ministry of Transport and Communications. FinnRA's management reports on its achievements and operative results to the Ministry. As regards road signs and issues related to traffic regulation, the Ministry has a powerful coordinating role towards both FinnRA and the municipalities.

2.2 Finnish National Road Administration, FinnRA

Public roads in Finland are managed by the Finnish National Road Administration (FinnRA), a governmental agency subordinate to the Ministry of Transport and Communications. The Cabinet appoints the Director General and the members of its Board. The Board is chaired by the Director General and composed of two members from the Ministries, two from the road user organizations, one from the municipalities and two from the main trade unions in FinnRA. FinnRA's Central Administration has a staff of 120 and the Service Units located at the same street address employ 400 persons. Nine regional administrations, Provincial Road Organizations (referred to as "Districts" in this paper), are responsible for the daily road management and operations. They operate as profit centers and employ appr. 9000 persons.



This graph presents some of the main developmental indicators of the road sector in Finland. The first oil crisis took place in 1973 and the worst economic recession since World War II started in 1991.



Box 3.

This list gives an indication of some of the general development issues which have contributed significantly to FinnRA's development since the early 1960s.

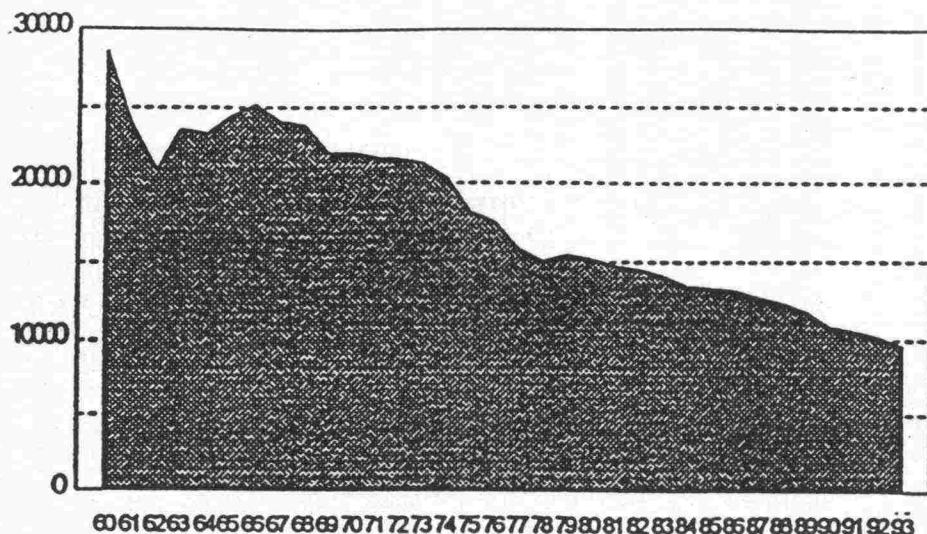
- (a) The development of computers permitted the processing of increasing amounts of information. The manually prepared planning documents were transferred into computers, alternative calculations could be processed easily, and the comparison of outputs against plans was made easy.
- (b) All highway engineers were trained in the operation analysis, the critical path method and other mathematical planning methods.
- (c) The first chairs of professors in the above subjects were established in the Finnish Technical Universities, Helsinki and Oulu.
- (d) Through new legislation in the early 1960s, FinnRA had to take over almost 30 000 km of municipal and village roads. The simultaneous increase of funds was minimal compared to the increase of the network from 40 000 km to 70 000 km. The only way to provide for sufficient maintenance of the new roads was to improve the use of the available resources.
- (e) Finland obtained its first highway sector loan from the World Bank in 1964. The Bank loans made a strong impact on the development of road construction and maintenance. Procurement procedures, documentation and specifications were actively developed.
- (f) The Ministry of Finance had established a unit to improve public sector efficiency. This unit selected one of the main consumers of public funds, the road sector (=FinnRA), to be its target organization. The Ministry's seminars and guidelines gave a good start for the road sector planning and monitoring development in FinnRA.

FinnRA's organization has undergone many changes over the past decade. Until the mid-1980s, FinnRA's HQ had six departments, an auditing unit, 25 divisions and 86 sections. FinnRA used to have thirteen provincial road districts, each of them with similar administrative, design, construction and maintenance divisions.

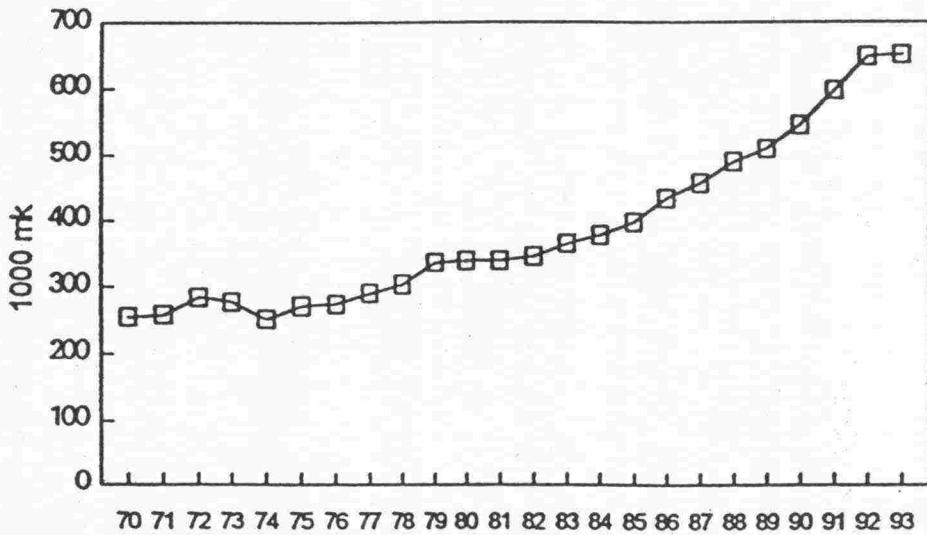
The disadvantages gradually outnumbered the positive effects, resulting in drastic changes in FinnRA's organization. As the independence of the districts was increased in the 1990 organizational reform and the service units were established in FinnRA's HQ, the production line contact was broken. The districts were given more independence in their operations and a freedom to allocate resources in order to achieve operational results.

Currently, the core HQ has no departments and only six divisions, including one for internal auditing. Ten service units (divisions) are located at the same street address. Today, there are nine road districts each with a slightly different organization.

This graph presents the development of FinnRA's staff since 1960.



Road management financing per staff member of FinnRA.



The financing of roads has also changed over the decades.

- During the 1950s, road financing was very modest, about 0.5 billion dollars/year. The funds were mainly allocated to post-war rehabilitation, winter maintenance and some network developments.
- During the 1960s, Finland experiences a road construction period with an annual financing of 1.1 billion dollars.
- The 1970s brought the first oil crisis and a shift towards maintenance and traffic safety. The annual financing was about 0.95 billion dollars.

During the 1980s, environmental issues gained increasing importance and road financing was about one billion dollars per year.

The 1990s started with vigorous road development, which was quickly cut down by the economic recession. The target financing of FinnRA is 1.2 billion dollars per year for the decade.

FinnRA's activities are financed through the Government's annual budgets approved by the Parliament. There is no Road Fund in Finland. The revenues from the road sector are collected as fees and fuel and other taxes. The revenues collected (appr. 3.4 billion USD) are about three times more than the Government's road sector financing (FinnRA, municipal and road cooperative support = 1.2 billion USD). The budget is based on the following principles;

- (a) The Parliament approves the annual targets which FinnRA should achieve with its allocations. The targets will be described more closely in chapter 4.
- (b) Net-budgeting allows FinnRA to retain all the income obtained by selling its property or services and to use the income for its operations. Net-budgeting also requires FinnRA to produce non-governmental services using only the invoiced income from such services (typically duties, e.g. export services).
- (c) The allocations in the budget are divided between:
 - Public Road Management (maintenance, operations and minor improvements)
 - Road Network Development
 - Buildings
 - Expropriations and Compensations

The above allocations cover both the physical operations and administration (both central and regional), planning and design, staff salaries, travel and office expenses, equipment, etc.

- (d) The allocations (excluding expropriations and compensations) are valid for two to three years, which makes it unnecessary to conduct hasty purchases at the end of the financial year.
- (e) To produce services, FinnRA has the freedom to obtain the necessary resources either from inside its organization or from outside.

FinnRA is also managing the administration and supervision of two additional budgetary allocations, a minor sum to support municipal road construction and a government subsidy to entitled cooperative roads, a total of about 20 million USD.

As a financial statement FinnRA prepares an annual balance sheet and an income statement and calculates some twenty basic economic ratios. These are presented in Annex 2. of this report. The preparation of the balance sheet

and the income statement plays an important role in defining the relationships between the internal owner and the internal producer (owner/contractor relationship), as will be presented in chapter 4.

The total assets of FinnRA amount to US\$ 1 190 000 000. FinnRA counts as its assets:

- Machinery and equipment
- Materials in stores and stockpiles
- Soil materials in deposits, gravel and rock
- Land and water areas (estates and land within the right of way)
- Buildings
- All road and bridge design, not yet constructed
- Uncompleted roadworks

The Government of Finland will soon publish the value of its national assets. This statement will include the current value of all road and bridge capital, which FinnRA estimates to be 17 billion USD (bridges only 2.4 billion USD). The reconstruction value of the Finnish road network is estimated to 25 - 28 billion USD.

FinnRA had paved way for the January 1993 reorganization by testing for a couple of years the functioning of the HQ service units (The Export Service Unit) and the production agreements with income statements and balance sheets with two road districts. The reorganization of FinnRA's headquarters at the beginning of 1993 resulted in the organizational set-up shown in chapter one. The Central Administration (HQ) with its six divisions has a staff of 120. The HQ acts as the owner and the road authority ordering all production (road design, construction, maintenance and administration) from the nine provincial road districts and all services and technical assistance from either the Service Units or the districts. The nine road districts operate under annual result agreements with the Director General (HQ). Within each district, there is an internal owner unit operating directly under the Provincial road director and production units which operate on the basis of production agreements.

The ten service units, the previous central administration divisions, are located at the same office address as FinnRA's HQ. They have their own result targets, which have been derived from FinnRA's targets. The service units have production agreements with the different divisions of FinnRA's HQ and with the districts. Some of the service units already sell part of their services outside FinnRA and collect fees for their services.

2.3 Municipal Road Management

The Finnish municipalities collect their revenues, part of which (0.6 billion US\$) is used for road and street maintenance and investments, only through municipal and real estate taxes and user fees. Parking fees add up a fraction to the revenues. Only a 4 million USD Government subsidy is allocated to some major streets. The municipalities used an additional 40 million US\$ of their own money to support the cooperative roads within their territory.

In financial terms, the technical services of the municipalities, including water, sewerage, waste management, parks and roads, account for less than a quarter of all municipal activities. The municipalities are traditionally financed through direct municipal taxes, and the general governmental subsidies are aimed at levelling out inter-municipal differences. During the 1980s, the property owners had to pay a levy specifically for street maintenance. A large part of this levy was collected from streetside business estates. This levy has since been abandoned for political reasons and been replaced by a general property tax, which goes to the general municipal treasury.

As long as the municipalities have no access to fuel taxation or any other transport- or road-related taxes, they are strongly opposing any attempts to transfer additional road responsibilities from FinnRA to them. On the contrary, FinnRA may need to take over some major municipal throughways in a few old cities.

There is an act covering the municipal road management. Each municipality has its own standing order stating in detail the principles of road maintenance and operation. The central organization of Finnish municipalities has issued guidelines for street classification and maintenance standards. Because of the municipal sovereignty the central organization, as a federation (see Box 4.), can only give technical assistance and publish guidelines, while the ultimate actions depend on each municipality. Streetside property owners have some maintenance obligations, especially as regards snow removal wintertime. The quality of road management, however, varies from one municipality to another. In the big cities, the provision of reasonable services has not been a problem. Most part of the 455 Finnish communities, however, are small and their resources limited.

Even today, one may see the quality of the road improve when entering a public road from a municipal street. The small governmental budget allocation for municipal road pavement works and improvements of city throughways is not sufficient to level off the differences. In rural municipalities, FinnRA in practice constructs and maintains the main village throughways. The weakness of small rural communities applies to both the technical capacity to perform complicated road works and the ability to finance the mechanization of the short length of municipal roads.

Municipalities have been hampered, even more severely than FinnRA, by the recent economic recession. The investments in streets have been reduced to half during the 1990s. In many municipalities, like in the capital city of Helsinki, the number of the city technical office staff has been declining for a decade.

Box 4.**Federation of Municipalities**

The Finnish municipalities have one joint central organization aimed at:

- Observing the common interests of all municipalities,
- Providing legal and financial advise to all municipalities (initial function),
- Providing technical assistance in the fields of statistics, education, environment, social and educational issues, municipal technical issues, including roads, and
- Negotiating on behalf of the municipalities for agreements with trade unions.

Municipal auditing, staff training and some other functions have been combined into joint stock companies owned by the Federation.

Because of the administrative independence of the communities, the unit responsible of road and traffic issues, can only propose technical instructions and specifications for voluntary use by each municipality. However, because of the high technical competence of the unit, such instructions constitute the general practice in the municipalities.

During the 1980s, the municipalities actively tested the use of contractors in their maintenance type of road services. In order to avoid additional laying off of their own staff, some municipalities have now reduced the use of road maintenance contractors. The municipalities are actively improving their productivity in street maintenance. The lowest unit rates can be found in small municipalities, which manage their roads and streets using local contractors and a minimal organization of their own (see Box 2, page 15).

The municipal technical offices report directly to the politically elected municipal councils and boards. Their freedom to reorganize and commercialize their operations is more limited than FinnRA's. However, the municipalities under financial constraints are increasingly applying the principles of commercially oriented profit center organizations, often called technical centers. These centers may have boards which have been granted some of the management powers of the municipal councils. Municipalities could, in fact, privatize their services more easily than FinnRA. They are also interested in using result management systems and the owner-producer division of municipal road managements similar to those of FinnRA. Some municipalities are using municipal applications on pavement management systems. Municipalities are also testing the same quality management principles as FinnRA (see chapter 11). In order to improve the cooperation between FinnRA and the Finnish municipalities, there is a standing committee monitoring the cooperative areas of the road sector.

2.4 Private (Cooperative) Roads

Outside the scope of public roads and streets, Finland has about 280 000 km of other roads, which will be called private roads (as a direct translation from the Finnish language) in this paper. The private roads are usually maintained by the land owner or the people living along the road. Since 1962, there has been a law on the use and management of roads which have more than one owner. These roads, which are not FinnRA's roads or municipal roads and not within a single property, can be managed as *road cooperatives*. Of all the 280 000 km of private roads, 104 000 km have been legally established as cooperative roads. The Government budget has annual allocations for supporting the construction and maintenance of cooperative roads, which meet the requirements specified below. Some municipalities also subsidize the cooperative roads within their territory. About 87 000 km of cooperative roads, which make up 17 400 road cooperatives, receive public support from government, from a municipality or from both. Their financing in 1990 came from the members of the cooperatives (about 50 million US\$), the Government (about 30 million US\$) and the municipalities (about 40 million US\$). A total of 700 000 permanent residents live along the cooperative roads and some 500 000 people additionally use them to visit their summer houses.

The preconditions for Government support are the following:

- A formal cooperative has been established
- The length of the access to a permanent residence is at least one kilometer.
- There are at least three estates with permanent residents along the road.

Each of the municipalities may have their own rules in supporting the cooperative roads within their territory.

Box 5.

One of the 17 400 cooperative roads is the Sakkola road in the southern Finnish municipality of Karjalohja (land area 123 km², population 1410). The length of the road is 4650 meters and the cooperative consists of 35 members. Only five families are permanent residents along the road. The rest of the members are owners of holiday cottages, forest and farmland. Because the residents are old and/or not professional farmers, they have selected a trustee from the nearby village to manage the finances of the cooperative and to organize the maintenance works. The annual maintenance costs for the whole road are about 3000 USD, which sum is mainly composed of winter maintenance and regravelling. In the case of the Sakkola road, the current Government support is about 45 % of the above costs and the municipality provides an additional 15 % of the total costs. The remaining costs are divided between the 35 members, depending on their land ownership and use of road. The trustee is billing about 200 USD for his annual services. The local maintenance supervisor of FinnRA inspects the road every second year.

Community participation in rural road maintenance in Finland has been presented in more detail in World Bank's Infrastructure Note of November 1992 (INUTD, Transport No. RD-13). The Finnish system shows that it is possible to create a yearround trafficable rural road network through a cooperative combination of community participation and government support. The important preconditions are;

- A legal framework to select the roads for support, to ensure that all beneficiaries are involved and free riders eliminated and to establish accountable entities to manage the selected roads.
- Government (or municipal) incentives in the form of monetary support for individual roads to assist maintenance organizations, and to ensure their accountability.
- The allocations of public support must be subject to technical inspections of the trafficability of the roads. Inspection assignments should be delegated to provincial or local governmental technical staff.
- The accounts of the cooperatives receiving public support must be subject to public auditing.

The legal framework requires compulsory participation of all those involved in the maintenance of a private road, both the land owners along the road and the main transporters, thus eliminating free riders. Democracy is ensured by the annual general meeting and the election of a chairman, a secretary, a trustee and other possible officials. Public support is an effective carrot in ensuring the quality of road maintenance.

The reason for the low maintenance cost per kilometer is actually due to three main factors. Firstly, the cooperatives are managed by the members and have no costly fixed organizations. Secondly, many of the members in the countryside are able to perform collectively the maintenance of their roads. The agricultural equipment of the farmers is often used for road maintenance. Thirdly, the road users seldom complain of the condition of their road, because they are themselves collectively responsible of the road. Neither the municipalities, nor FinnRA is willing to take over any cooperative roads as municipal streets or public roads. In case of a transfer, there is an increasing demand for improving the road's condition and for providing a surface dressing or an asphalt pavement. Such demands are usually made as soon as the users no longer need to pay directly for the cost of such operations.

3 DEVELOPMENT OF PLANNING AND ORGANIZATION

Road Network Planning
Development of Organization
Management Systems and Operational Planning
Development of Information Systems

3.1 Road Network Planning

The development of the whole road sector planning process has been an essential prerequisite for improving road management and ensuring FinnRA's possibilities to influence in the road sector policy-making. Since 1960, FinnRA has produced more than half a dozen long-term road network development plans. The first plans focussed on estimating the adequacy of the size and quality of the road network in relation to the rapidly increasing traffic. During the first oil crisis it became evident that the focus should be shifted from road construction to the rehabilitation, maintenance and management of roads. The most comprehensive plan was the 1980 - 1990 National Road Network Management, Rehabilitation and Development Plan. Unilateral development proposals gave way to alternative options for development. The 1980 plan included the four following policy options:

- (a) The basic proposal aimed at safeguarding the present service level of the network and the preservation of the condition of road structures. Additional targets included reduction of the need for transport energy and the number of traffic accidents. The proposal also had regional development aspects.
- (b) The first alternative would have safeguarded the present road and traffic conditions in Finland. In practice, this alternative focussed on maintenance, rehabilitation and minor improvements for road safety and non-motorized traffic.
- (c) The second alternative would have developed the road network from the viewpoint of transport economy. The goal was to reduce time as well as vehicle and accident costs and to promote economic growth. This alternative required road developments in built-up areas and between major cities.
- (d) The third alternative would have safeguarded basic transport needs all over Finland. This alternative encouraged national decentralization and regional development policies. Road rehabilitation and the development of a secondary network would have received more attention.

In practice, the 1980 plan gave a strong impact on the development of maintenance, especially pavement repair and winter maintenance, road strengthening and pavement rehabilitation. More importantly, public participation increased through discussions on the TV and radio and in various road sector events. Government and municipal administrations, business life and pressure groups contributed to these discussions.

The road development plan currently under review covers the years from 1995 to 2004. It has been prepared in line with FinnRA's road management vision for 2005. This booklet describes FinnRA's long-term road development goals and organizational development ideas until the year 2005. The visionary situation can be reached by using a number of alternative strategies. The plan covers the following topics;

- (a) Road network and its condition
- (b) Road traffic
- (c) Road management goals, taken from FinnRA's vision 2005
- (d) Routine maintenance
- (e) Periodic maintenance, rehabilitation and other measures to safeguard the structural condition of roads.
- (f) Road network development
- (g) Minor improvements of roads, road environment and safety measures
- (h) Traffic management
- (i) Road user services

The last two items are reasonably new aspects of FinnRA's activities aimed at direct improvement of customer services. Road users are considered to be FinnRA's main customers. The need to find new financial instruments, such as road tolls, congestion charging, etc., are discussed. Traffic management is considered a new tool for postponing large investments, relieving congestion and improving traffic safety. Transport telematics and intelligent vehicle - highway systems (IVHS) are being tested. Customer services, road and traffic information, roadside services and tourist information are included in item (i). The dialogue with the ministries, the other government agencies, industry, municipal organizations, road users and other interest groups is a vital element in gaining support for the plan (See chapter 7.).

The preparation of a national road network development plan is a major project. The current plan for 2004 took ten months to prepare, including discussions with all the interest groups. The preparation requires a large amount of accurate information. The collection of information has been a major effort in the districts. The amount of work needed for information collection for the 1980-1990 plan required tens of staff years in FinnRA's organization.

The more detailed plans of FinnRA include the 4-year action plans and the annual plans prepared as a basis of budget preparation. The ten-year plan serves as a framework for these short-term plans.

3.2 Development of Organization

FinnRA's organization has undergone four major changes since 1970. The first organizational development project during this period lasted from 1969 to 1972. Apart from having general operational and administrative development

goals, this project aimed at a direct production line organization, specialization, strong central management with auxiliary research and planning units, and delegation of power to the districts. The new organization was similar to a business concern with central management, administrative and development functions and regional result units for production (districts). The HQ units were influential in the operational issues of their respective fields down to the site level. The project produced detailed job descriptions and a delegation hierarchy from the DG down to the site and maintenance area supervisors. At that time, FinnRA needed to develop production and work methods. The new organizational structure served its purpose well.

The latest reorganization has no longer involves the original production orientation, but rather focusses on business management and result-driven organization. FinnRA's current organization scheme was presented in chapter 2. The leading principle of the new organization is to separate the administrative part of the organization (the "owner") from the productive part. The administrative (owner) part of FinnRA has to secure the financial resources, maintain an enabling operating environment and administer the road network. This includes legal issues, strategic planning, general administration, research, development and auditing of operations. The "owner" orders from the producers the execution of operations. In terms of road districts, this means road management, planning, design, construction and maintenance within the area of the district. From the service units the "owner" orders administrative and development tasks. In addition, the service units "sell" their services to road districts and external customers (see Chapter 4.).

FinnRA's organizational development will be a continuous process for two coming years. The basic alternatives currently under discussion are:

- (a) To apply and further develop the current organizational pattern of an internal owner-producer division.
- (b) To follow the Swedish pattern of converting the productive units into one parastatal.
- (c) To establish a parastatal road production organization and to appoint (hire) an engineer (consulting firm) to manage road maintenance and development contracts. This alternative closely resembles the British approach.

At the printing of this paper, the focus of the development is directed towards the alternative (b).

During the last three decades most part of FinnRA's organization development has been initiated from inside. In this way FinnRA has had more freedom compared to initiatives and pressure from outside. The present organization development team is composed of selected FinnRA's managers. External consultants are used only for process advisory and business management training.

3.3 Management Systems and Operational Planning

In order to develop public sector management systems and operational planning, the Ministry of Finance initiated in the early 1960s a planning development program, in which FinnRA was one of the first participants. At the same time mathematical operation analysis methods and computerized data processing became a common practice. FinnRA's development division produced work planning files for all the main components of design, construction and maintenance works, using work measurement methods. This development work resulted in large files of work method data of the best contemporary practice. The contents of the files were extensively imparted to all the technical staff in FinnRA. Based on the experiences of the first World Bank road loans, the Bill of Quantities was also improved. FinnRA's staff developed a good state of the art knowledge of project planning methods and time scheduling (CPM and related methods), a cost and material consciousness, and an ability to optimize the use of resources. Having recorded the contemporary production practice into FinnRA's work planning files, the same division continued their time and method measurements to improve the old work methods and to develop new and better ones. FinnRA's development work in road construction planning was also utilized by many Finnish construction companies, both domestically and in their export projects.

An integrated computerized planning and follow-up system covering the main work processes was developed in the late 1960s. For this purpose, mid-size computers were acquired for all district offices. The planning system was initially uniform for all works. The input data were collected from the annual project plans of design and road construction projects and the maintenance areas, workshops and stores. The follow-up data were collected through administrative processes, such as the payment of salaries, purchase of store items, contract payments, payments for contracted trucks and equipment, repair and maintenance of FinnRA's own equipment, purchase of soil materials, etc. Because all payments to staff and for contracted equipment and trucks and the purchases used the same process, all the input data were fiscally correct. The reports contained information on the completion of works, cost data, unit prices and deviations from the plans. The system provided accurate follow-up information on FinnRA's own equipment and stores. During the 1970s, the planning systems for design, construction and maintenance were gradually differentiated.

Box 6.

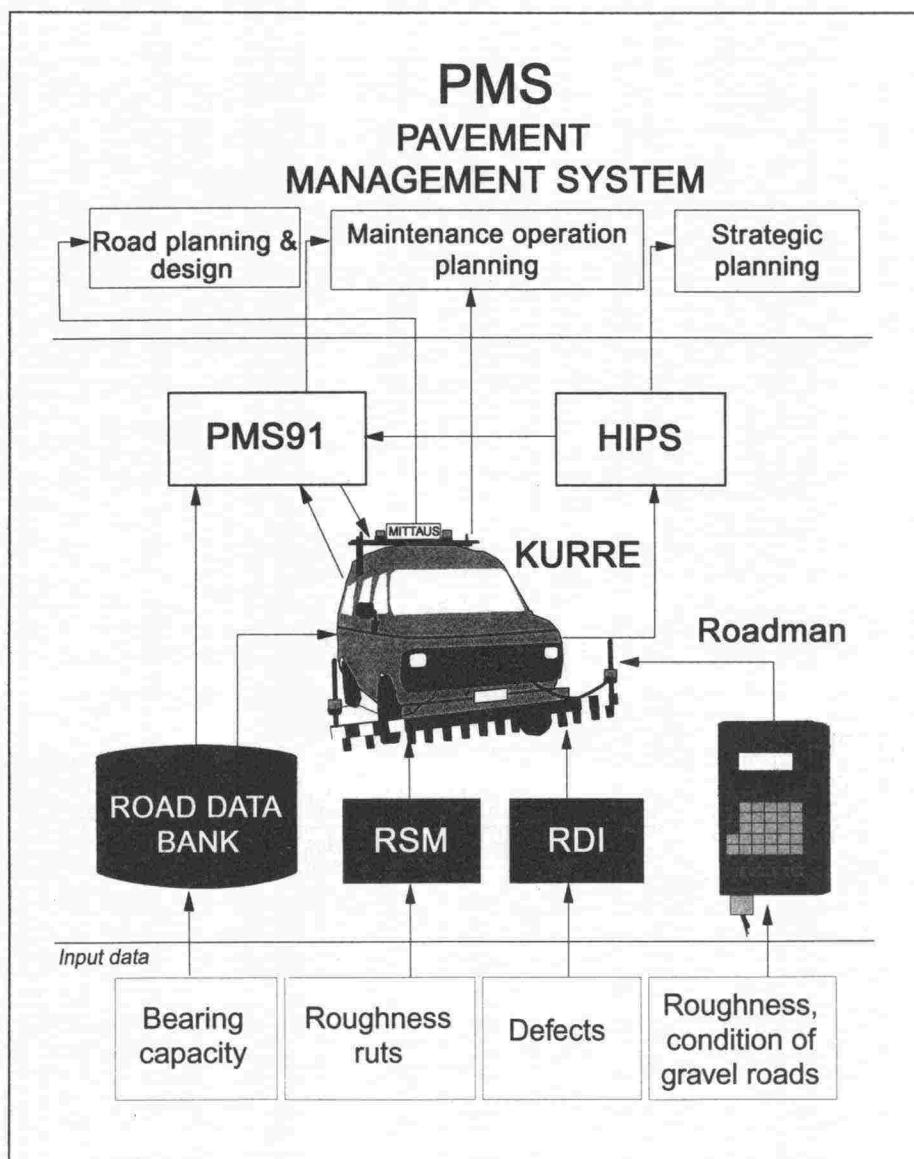
The negative side of integrated computerized reporting was the quality of the reports. Each month, the project managers and chiefs received a thick bundle of data files as planning reports. The only way to manage the detailed reports was to look at the possible deviations from the planned works. In practice, this could be called "management through deviations". As an example, a maintenance area supervisor would receive monthly reports with the following information:

- (a) Total costs of the area, deviations from the plans and the available balance.
- (b) Differences in the amounts of executed works by the type of work
- (c) Cost deviations by the type of work
- (d) Costs for various types of work
- (e) Differences in amounts compared with the Bill of Quantities
- (f) Cost and unit rate deviations from the Bill of Quantities
- (g) Costs by the Bill of Quantities

In addition to this, an area supervisor would receive reports on the use of equipment, a cost report, a report on use of resources per cost item, and calculations on ratios of efficiency and productivity with district wide-comparisons.

The introduction of the result budgeting and the integrated reporting caused initially confusion and resistance. The planning and budgeting was considered as an additional administrative and non-productive work. The reporting was seen as a mode of a more strict control and pressure towards the first level management. Previously it used to be sufficient to prove that the funds were used for a certain project (task). Now the managers had to prove that the funds produced the planned results (impact). In addition, new economic terms were introduced in FinnRA.

The following graph presents one of the present key information management systems of FinnRA. The development has led to a number of separately managed expert systems, which are using a few centrally managed data stores. The Road Data Bank and the respective Bridge Data Bank are the basic and most important stores of road and road condition information, supporting a large number of FinnRA's expert systems. Data are stored continuously whenever a new piece of information is available. Financial and other management systems have their own separate databases.



A typical example of the development of expert systems was the creation of the Pavement Management System (PMS). During the late 1980s, the PCs, the mathematical models and, most notably, the automated measurement devices were sufficiently developed to make it possible to collect and process large amounts of road and road condition data. The Finnish PMS system was developed as the outcome of a competition between four different PMS versions.

For road network management, FinnRA developed a Highway Investment Planning Program (HIPS), which has been further developed as a training model in cooperation with the Bank's Economic Development Institute (EDI).

Infrastructure Management System, Case-Study, Helsinki 1993, FinnRA Research Reports 4/1993, ISBN 951-47-8102-3, ISSN 0788-3706

3.4 Development of Information Systems

FinnRA's basic information has been collected for decades using a centralized information computing system and a number of centrally managed registers, a road databank, a bridge databank, etc. The target budgeting system has unified the information processing since 1965. The aim has been to (a) collect each data item only once in the process, (b) to code each item using a uniform data and cost code, and (c) to process the same data for all reports. Using the International Business Machines Co (IBM) as a consultant, FinnRA conducted an extensive survey of the needs to develop its information management during 1981 and 1982. At that time, the DG had a vision of introducing computerization down to the site management and maintenance area level.

The result information needed by FinnRA for financial management and external needs is composed of;

- Accounting information
- Result information, budgets, production agreements, financial calculations, etc.
- Planning information
- Cost estimation and pricing
- Budgeting and annual planning
- Work planning, project management and follow-up
- Resource management, personnel, equipment, buildings, stores, etc.

Box 7.

The lessons learned from FinnRA's planning process development can be summarized as follows:

- (a) The road databank, a relational database, easily grows into huge proportions. It is advisable not to collect initially all the possible information at the same time. It is possible to add information gradually into a well designed system , whenever new information is available.
- (b) The coding of information, such as the Bill of Quantities, for example, should be uniform but not too detailed. It should be flexible enough to allow a coding of items at various levels of detail, and the reporting system should be able to summarize results for the different managerial levels.
- (c) Each organization should develop its own work planning information system, collect planning cost data and create method files. Own research and method development is vital.
- (d) The planning and information systems should produce accurate and readable management reports, which is easily made possible by the modern computer programs. Management involvement is important in using and requestingm data and reports and in providing feedback. Management has an important role in motivating the first-line data collectors and recorders to provide accurate basic information.
- (e) The continuity of data series is important to permit benchmarking for good performance, to assist auditing in finding deviations and to promote all research and development work.
- (f) There are pros and cons in developing an integrated comprehensive information management system like the one used by FinnRA. The advantage is that each item of information is recorded only once and is used in all subsystems in the same form. If the information is correct, it produces correct results, and it cannot be manipulated during the data processing. The disadvantage is that in an integrated system everything influences everything, and the system is seldom user-friendly. A complicated system is vulnerable to false information and sensitive to failures in planning and upkeep. The system should have controls to allow accuracy checks by auditors or system managers.

4 RESULT MANAGEMENT

Management by Objectives
Evolution of Management Systems
Staff Incentives to Improve Results
Result Management
Role of the Parent Ministry

4.1 Management by Objectives

Since the mid-1970s, FinnRA has provided management training to its top and mid-level managers. External consultants trained the Managerial Grid and other management systems. The development of long-term goals led to a retraining of the management to make them manage their units towards the general organizational goals. It became evident that the managers were not able or even expected to manage everything in detail. It was recognized that to manage a division without keeping in sight the goals of the whole organization would be like being a jockey with blinders in a horse-race. One management tool introduced in the literature at that time was *Management by Objectives (MBO)*. This method was chosen by FinnRA as its main managerial system. The MBO system, FinnRA's planning system and the ideas of participatory leadership were all incorporated into one management system.

Box 8.

The main objectives of the MBO system were:

- (a) To focus the planning process and the organizational objectives to the most important and critical areas of the organization, *the key result areas*. In this way the management avoided dealing with minor issues and guided the organization to work on the most important tasks.
- (b) To motivate staff to perform better and to clarify to everybody the tasks where results should be achieved. Result discussions between the superior and his/her subordinates were important MBO tools.
- (c) To ensure the penetration of the management's objectives throughout the organization down to the grass root level. In this respect, the objectives of the higher level and the actions planned for achieving these objectives, always served as the basis for the objectives and actions of the subordinate level.

FinnRA's objectives were based on its business idea. The following is FinnRA's current business idea:

The Finnish National Road Administration is responsible for public roads and makes it possible for road users to travel safely and conveniently.

Initially, FinnRA developed its business idea and objectives on the basis of the general policy requirements of the Ministry. FinnRA's management decided on the general key result areas and the overall objectives. Out of these objectives, the production lines (administration, planning/design, construction and maintenance) derived their operational and production objectives. The organizational units, i.e. the districts and the HQ divisions, had their own managerial objectives. The simultaneous drawing up of objectives in a matrix with vertical production lines and horizontal organizational units gave rise to many conflicts of interest.

FinnRA's objectives were related partly to the condition of roads and traffic (society goals), partly to the economy and efficiency of the organization (operational goals). As an example, the HQ level objective to improve traffic safety would require a number of actions from black spot improvements to the quality of wintertime maintenance. In the districts, the respective objectives would be related to the execution of a number of black spot improvement projects and winter maintenance quality objectives for different road categories. Local level maintenance areas had individual road improvement projects and specific quality requirements for individual road sections.

Box 9.

Organizational Objectives and Measurement of Results

In MBO, the results of an organization are achieved through many individual goals or objectives. In practice, the objectives are not isolated but interactively related to each other. The optimization of one individual objective will seldom give an optimal result for the whole organization. A good objective needs to have the following properties:

- (a) The objective should focus on influence and result in the performance.
- (b) The objective should be in line with the goals and strategies of the organization.
- (c) It should fit in with the hierarchy, where the lower level objectives are derived from the higher level objectives, and the lower level objectives fulfil the objectives of the higher level.
- (d) The objective should be measurable, preferably numerically. This is not always possible, and a subjective evaluation is sufficient in such cases.
- (e) There should be no discrepancies between the objectives within an organization.
- (f) The objective must be realistic, and it should be possible to achieve good results with planned activities.
- (g) The objectives are stated in accordance with the organizational lines. In practice, FinnRA's objectives were created in the matrix of organizational levels and production lines.

The results in MBO can be measured by using;

- (a) products (outputs) or inputs, or input/output ratios
- (b) verbal statements
- (c) actions needed for the achievement of objectives
- (d) implementation of time schedules
- (e) substitute measurements and
- (f) general evaluations.

MBO requires constant information flows and well-developed information systems (See Chapter 3).

4.2 Evolution of Management Systems

The MBO system had a strong developmental impact on FinnRA's management. It consolidated the large and dispersed organization, which had 13 districts and hundreds of local offices and units all over the country. New developmental ideas penetrated the organization through the MBO system. Without a uniform management system, it would have been difficult to put into practice the top management's ideas at the hundreds of construction sites and maintenance area offices. A good example of a new idea which was rapidly introduced to all organizational levels was the improvement of customer satisfaction and customer service in FinnRA.

As a consequence of MBO, all the managerial levels have improved their skills in planning quantitative and qualitative objectives. The staff have learned to focus planning on the key result areas. The result discussions committed the staff to the objectives of the organization.

However, the MBO did not function without problems. The horizontal coordination in the HQ and in the districts was not very good. In the administrative units, the objectives were often vague and the actions merely check-lists of uncompleted works. Some of the objectives were isolated and not in line with FinnRA's overall objectives. Forceful division chiefs managed the system from below upwards. Finally, the system generated a lot of paperwork.

4.3 Staff Incentives to Improve Results

The development of result management made FinnRA ready to volunteer, as one of the first three Government agencies in Finland, in the experiment of applying incentives to improve the organizational results. The adopted system was a collective, result-based *Bonus Salary System*. Pilot districts used the system in 1988 and 1989. Since 1990, all of FinnRA's staff have been entitled to annual salary bonuses if they have performed (as a unit, not individually) above the average performance and achieved their goals.

The bonus salary system aims at compensating the staff for achieving the result objectives defined for FinnRA. The general goal is to improve productivity, efficiency, cooperation and management. The system is an integral part of FinnRA's management. The achievement of goals is measured by using both measurable indicators and verbal evaluation. The bonus is a separate payment, not a salary, relative to the individual's gross salary. The ceiling of the bonus funds in FinnRA is 3.5% of the total staff salaries. The money has to be saved from FinnRA's operational funds. The system has two steps. The main part of the bonus depends on the results of the district (or HQ) and the rest on the result of the individual unit. The results of the district (HQ) may account for up to half of the bonus funds, and the results of the individual unit for the other half. An individual person may earn up to 6% of his/her salary as a bonus. The amount of bonuses paid to FinnRA's staff in 1993 was 2.5% of the total salaries.

Staff interviews reveal that the bonus system, even though it is very modest, has somewhat improved the productivity, management, cost efficiency and service quality in FinnRA. The most important issues in introducing a system of this kind are, (i) the acceptance of the goals and (ii) the understanding of the

system of measuring the results by the staff involved.

4.4 Result Management

The theory of MBO was further developed towards *Result Management*. The theories of result management and MBO are closely related. Result management is more closely concerned with the final results of the organization and, in the case of FinnRA, gives more consideration to the road user as a customer. Result management gives more freedom to the individuals and units to choose the methods for achieving the results. Participation by the members of the organization is an essential element, as is also the free flow of information.

As a consequence of the economic recession, the Government's demands for improved results increased in the Finnish administration. The shift to result management was a natural step for FinnRA. This development required organizational changes to increase the operational freedom and accountability of the organizational units of FinnRA (see also Chapter 2 for the organization scheme and Chapter 6 for reorganizations).

The targets of defining the new operational rules for FinnRA by the Government were;

- (a) The need for increased flexibility and capacity to react in a changing environment.
- (b) The increased importance of the issues of quality, safety, environment and public participation.
- (c) The need for improved efficiency and economy.

In 1992, the Cabinet issued a decision-in-principle on further public sector reforms. In this program, the Government aimed at:

- (a) allocating increased responsibility to the public agencies in their efforts towards good results,
- (b) increasing the independence of the agencies in deciding on their organization and economy
- (c) promoting the use of market forces for improving the efficiency of public services
- (d) reforming personnel policies and staff management to encourage better performance, manager and staff development as well as improved use of resources.
- (e) downsizing the administration and delegating authority from the central government to the regional and local levels.

The decision-in-principle, which FinnRA expeditiously adopted, proposed an internal distinction between *the customer (owner)* and *the producer* in the

public services. The internal customer is responsible for providing financing and is free to choose the services or products to be produced as well as the actual producer. The producer's role is to provide services or products, as agreed upon in advance, in accordance with the pre-defined goals, quality requirements and allocations (prices). The rule is that all products and services, other than those provided under the public law, should be produced as chargeable services and in accordance with commercial principles. The services may be produced in competition, within the administration, jointly by the public and private sectors or by the private sector alone. A major administrative development was the delegation of authority and decision-making to the level where all the necessary information is available and the decision-maker is closest to the customer (see chapter 6). As a rule of the thumb, all public services, except the ones provided under the public law, should be produced with commercial principles and as chargeable services.

The permission for FinnRA to use *Net Budgeting* was a reform essential for achieving good results. Currently, all the income earned by FinnRA can be retained and used by FinnRA for its operational expenses. Each division and district in FinnRA can use such income to pay for its own expenses. Net budgeting is an intermediary stage before introducing fully commercial business accounting.

Box 10.

FinnRA's Vision for the 1990s

During the late 1980s, FinnRA published a visionary document titled *Road Administration in the 1990s*. In this vision, FinnRA was not only expected to be responsible for road and traffic management, but also to assume more extensive responsibility for road traffic. FinnRA was to gradually abandon its own construction activity and to become a contract manager and a road developer. Competition was predicted to increase in all activities. FinnRA was envisioned as an "internal public enterprise" with internal service units charging for their services. The first unit of this kind was to be the Export Service Unit of FinnRA's HQ. Being an internal public enterprise, FinnRA would be simultaneously:

- (a) A Road Authority responsible of public roads which provides to the road users safe, convenient and economical travel conditions, and
- (b) A Production Organization, which
 - implements road management services ordered by the Government,
 - manages and evaluates its activities using indicators of productivity and business economics,
 - conducts business activities, such as consulting services and contracting,
 - utilizes net budgeting to full extent,
 - may borrow money to finance its activities, and
 - decides on its own production programs.

Since the beginning of 1994, all the nine road districts have been making *Result Agreements* with FinnRA's HQ, which are signed by the DG and the Provincial Road Director, PRD. In a result agreement, the district agrees on productivity and financial targets, sales targets and to the production of road maintenance, rehabilitation, road safety and environmental works, development projects, road design works and administrative assignments at a certain price. The contents of a result agreement are shown in Annex 3.

The road districts are internally divided into a customer and producers. The staff working under the road director make up the internal customer organization. The other parts of the district organization consist of producers, administrative units, stores, workshops, design offices, construction sites, maintenance area offices, etc. To a certain extent, the district may enter into agreements with municipalities, road cooperatives and private companies to produce services against agreed upon fees. Net budgeting allows the district to use such income to finance the production of services and to retain the possible profit.

From the road management point of view, FinnRA's present organization operates using the same principles as a large business concern.

4.5 Role of the Parent Ministry

The role of the Ministry of Transport and Communications in FinnRA's result management is twofold. In its first role, the Ministry is the customer for FinnRA on behalf of the road users, society and the Government. In this role, the Ministry defines the service level of the road network, using traffic fluency, road safety, the condition of roads (see chapter 11) and the environmental impacts as service level indicators. In basic road management, which includes routine and periodic maintenance and rehabilitation works, FinnRA is allowed to choose the projects and activities best suited to achieve the targets. The Parliament, in its annual budget discussion, decides on the major development projects. The Ministry then places an order to FinnRA to execute these projects.

In its second role as an owner, the Ministry defines the targets for FinnRA's productivity and cost-benefit efficiency; the return on the capital invested by FinnRA, the profit percentage of the tied-up capital and the rate of circulation of the tied-up capital. In these two roles, the Ministry defines the overall annual result targets for FinnRA.

Box 11.**Result Targets for FinnRA in 1994**

The targets for FinnRA in the state budget for 1994;

- (a) The activities of FinnRA will result in a reduction of 70 injury accidents and 7 fatal road accidents (minimum). The total number of accidents on public roads will be less than 3900.
- (b) FinnRA's activities will reduce the pollution of ground water caused by road traffic and operations, reduce noise pollution and improve the roadside milieu.
- (c) The target level of service for the main roads in wintertime will be reached during 88% of the winter days.
- (d) The current condition of the road network will be maintained. The ruts on the main roads will not exceed 20 mm. (*Finland is one of the few countries with almost all cars using studded tires in wintertime*). The maximum length of defective pavements shall be less than 7500 km and structurally poor roads shall not exceed 1200 km.
- (e) The cost efficiency of FinnRA will improve by 1 %.
- (f) The maximum overhead (administrative) costs of FinnRA will be less than 105 mill. US\$.
- (g) FinnRA's operational return percentage will be at least 5% and the velocity of circulation of invested capital will exceed 1.1.

Mr. Markku Teppo, FinnRA, Development of Management and Organization in the Finnish National Road Administration, for OECD Public Management Service; an internal paper of FinnRA.

Mr. Sven-Ake Blomberg, Provincial Road Director, FinnRA, Road Agency Management; paper presented at the World Bank/EDI Transport Management Development Program (TMDP) seminar, November 1993.

5 PERFORMANCE EVALUATION

Development of Performance Evaluation
Improvement of Project Management Performance
Process of Performance Evaluation
Evaluation of Maintenance Performance
Benchmarking

5.1 Development of Performance Evaluation

The development of information and accounting, planning and management systems (MBO) was followed by a development of performance evaluation. Performance evaluation is a managerial tool comparable to control, inspection and auditing. It is closely connected to MBO, quality and result management, staff management, staff compensation systems and the planning of organizational goals. The performance evaluation of construction quality can equally well be called quality control or quality management (see chapter 11), as well as internal inspection or technical auditing (for auditing, see chapter 10).

The aim of performance evaluation is to assess how the organization has managed its operations and the individual staff members have done their duties and to analyze the reasons for deviations from the plans. In addition to this, performance evaluation is used to analyze the use of production resources and the efficiency and economy of the organizational performance.

During the 1970s and 1980s, FinnRA's information management systems produced long time series of uniform information. The production line organizations of road construction and maintenance were organized and operated in a uniform way in all the thirteen road districts that existed at that time. This helped to make comparisons between the districts, and FinnRA actually developed an internal benchmarking system for evaluating its construction and maintenance performance. The annual performance information was collected into large compendiums of FinnRA's construction sector information, as is presented in Annex 3.

Most of the performance evaluation was done internally. External organizations were only used for quality monitoring of asphalt works. Contract agreements had the provision to use an external arbitrator in case of any contractual performance disputes. However, within FinnRA this was very rare. Sometimes, in case of a dispute between a contractor and the district which had signed the contract, an arbitrator was invited from the HQ to settle the dispute.

The process of quality performance evaluation proceeded bottom-up from the site level. The site manager was the first-level evaluator of the quality of the individual sections of his/her site. The project engineer managing a number of sites, in turn, evaluated the sites, and the Construction Manager of the District evaluated all the construction projects. The Provincial Road Director, PRD, evaluated all his sectors, including road and bridge construction. At the HQ level, the Geotechnical and Construction Management Divisions evaluated the quality of FinnRA's construction works. The Director of Production was, in practice, the highest evaluator of construction quality performance in FinnRA. The DG's annual discussions with the PRD occasionally touched upon some

construction quality issues.

During the semiannual construction managers' meetings, the results of quality control and other performance evaluation issues were discussed. Poor performers were not publicly embarrassed. On the other hand, the best performers were praised and the best practice solutions were presented and discussed.

In the present organization, and as a consequence of the cutting off of the production line management, there is only one annual federal construction management meeting, which focuses on technical and system management issues. The performance evaluation issues remain at the internal discretion of each road district being evaluated in relation to the result agreement between the PRD and the DG (see chapter 4).

5.2 Improvement of Project Management Performance

From the construction site management's point of view, FinnRA's project group work method is of interest. A project group will be established to prepare any major road project. The group is composed of the design, construction and maintenance staff involved in project execution. The group is managed by rotating the chairmanship. The chairman is initially (a) the chief design engineer, (b) during the construction the site manager, and (c) for a couple of years after the project completion the maintenance area supervisor. The idea is to bring in to the design phase the best contemporary construction practice and the maintenance staff's knowledge of the local conditions. During the construction period, the design engineer will give his/her support for plan alterations and the maintenance staff will assist in traffic regulations, etc. All the completed roads have to pass a muster before they are handed over to maintenance. The construction site, even in task force work, has a warranty period of one year. The practice of project group team work has produced good results by bringing feedback from construction and maintenance into road design.

5.3 Process of Performance Evaluation

Performance evaluation and result management are closely interrelated in FinnRA's management. The result agreements between the districts and the HQ have a number of performance indices. In the plan for 1995, half of the performance goals are related to operational performance (traffic safety, winter maintenance, condition of roads and environment) and half to economy (financial results and the rotation of invested capital). Performance evaluation is an essential part of FinnRA's bonus salary system. Chapter 4 will describe in more detail how the result agreements are made and how the performance and the results are measured for the salary bonus system.

The performance evaluation process has the following phases;

- (a) Development of performance indicators and systems of performance measurement for each individual result objective.

- (b) Collection of result information.
- (c) Comparison between performance and the previously stated goals and analysis of deviations.
- (d) Analysis of the consequences of the performance.

Performance is evaluated by analyzing the basic reports produced by the information and accounting systems of the organization. The analysis of the key performance figures is an integral part of the process. This analysis gives valuable feedback to the planning and execution process.

Performance evaluation in FinnRA has two focal points: (a) measurement of productivity and efficiency, which will be covered in this section, and (b) measurement of quality, which will be covered in chapter 11. Initially, productivity evaluation was based on unit price comparisons (FIM/road-km, FIM/m², FIM/m³ etc.) and efficiency evaluation on the use of production resources. The performances of individual sites and maintenance areas were evaluated using such indicators as the timeliness of the work execution and the cost variations compared to the cost estimate.

To make use of time series and to improve the comparison between districts and sites of different sizes and works of different types, FinnRA developed an index for production economy. This index covers some 35 of the most common work items of the Bill of Quantities. The unit prices of selected items of completed works were computed into the index as a cost calculation of a theoretical standard road section. This index could be used to indicate the relative change in the production economy of both FinnRA and each district. To compare the districts mutually, FinnRA compared the performed unit rates of each district with the average of the same units in the whole country. In bridge works, productivity was calculated using the unit prices of completed bridge deck (FIM/m²) works. The unit price index system is insensitive to local conditions, climatic variation, etc. The user must be careful in eliminating individual exceptionally high or low rates. The system only indicates the price level difference between two observation points (districts) or between two years. The scale difference is considered constant, which is a disadvantage when comparing small and large projects.

In order to evaluate the impact of various production factors on the production economy, FinnRA has tested the Translog function in its performance evaluation. With the Translog function, FinnRA tested the impacts of the speed of production, the scale differences, and the price and production factor substitution. With the Translog, FinnRA was able to assess historical development (time series) and to compare districts with each other. Production economy can be described as a function of the input and productivity factors, including management factors (speed of work, number of staff), scale factors (size of the project, width of the constructed road), and a change in technology.

5.4 Evaluation of Maintenance Performance

In FinnRA, the evaluation of maintenance performance has two focal points, (a) the assessment of production economy and (b) the measurement of road condition. In this chapter, mainly the issues of production economy will be discussed. Issues related to quality will be discussed in more detail in chapter 11.

In evaluating maintenance performance, the simple cost-per-unit figures (FIM/km, FIM/vehicle-km) require additional data on the road condition, quality, climatic and other regional factors. Maintenance productivity is a combination of quality, as measured on the road (see chapter 11), and production economy. FinnRA's evaluation of maintenance productivity takes the quality into consideration by detracting the road length which does not meet the quality criteria. In the production economy calculations, in FIM/km, the reduction in length will increase the unit rate. The production economy is again divided into the economies of;

- (a) selected maintenance operations
 - winter maintenance
 - hot mix pavement maintenance
 - maintenance of cold mix pavements and surface dressed roads
 - gravel road maintenance
 - maintenance of fixtures, road signs and other devices and
 - maintenance of roadside areas and waste collection
- (b) development of unit rates, computed in the same way as in construction productivity measurement, and
- (c) development of organizational productivity in the form of
 - overhead costs per kilometer and
 - price index of maintenance resources in FIM/hour.

Because road maintenance mostly uses FinnRA's own equipment, the resource price index mainly includes the prices charged by FinnRA's Plant Pool (see chapter 8).

Maintenance performance measurement is mainly aimed at estimating productivity at the district level. The system is, however, suitable for measurements at the maintenance area level as well. The development is mainly followed by using time series. Same calculations are also used to compare districts with each other and with the general development in FinnRA. Some of the maintenance operations depend on the weather conditions (winter maintenance) and additional indexes are needed to describe external conditions.

5.5 Benchmarking

Whenever the information systems make it possible, FinnRA publishes internal statistics comparing its units with each other and with the national average. This internal benchmarking has created a competitive element, which is an effective way of improving the general performance. If the HQ does not produce sufficient information actively enough, a construction or maintenance manager may approach his/her colleagues in the other districts and compile informative statistics to evaluate his/her position on a single issue. Within a district, its maintenance areas are compared with each other similarly to the construction sites or even the project design offices. The comparative reports are discussed within FinnRA in national and district level meetings.

The use of consultants and contractors has helped to compare in-house work and comparable private sector performance. It has been estimated that the private sector can bring in new ideas and new methods of works more flexibly. Statistically, it is difficult to prove that private companies are producing better quality or cheaper works than FinnRA itself. In many cases FinnRA's own tender has been cheaper in road and bridge construction than those of the contractors. During a period of economic growth contractors tend to be more costly, while during recession they tend to offer lower prices.

In its continuous search for improved performance, FinnRA is currently evaluating the possibilities of using external benchmarking as a performance evaluation tool. In external benchmarking, the results achieved by FinnRA will be compared with those of another organization operating in the same field. In the benchmarking process, FinnRA will analyze the performance of the comparable organization, aiming to find and understand how they are able to perform well, be possibly more productive, produce better quality and be more cost-effective. The organization selected as FinnRA's counterpart in the benchmarking process is the largest road contractor in Finland.

6 DELEGATION OF AUTHORITY

FinnRA's Reorganizations
Present Decree and Standing Order of FinnRA
Principles of Delegation

6.1 FinnRA's Reorganizations

During the 1970s and the early 1980s, Finland underwent a general period of decentralization. During this time, part of the administrative and operational authority of the Ministries and central agencies was delegated to provincial and local-level organizations. A few governmental units were even relocated outside Helsinki. In the case of FinnRA, part of the decision-making authority was handed over to the road districts.

FinnRA's reorganization in 1975 produced the first comprehensive organization files and a standing order. This included job descriptions, the authorities to sign documents, the duties and responsibilities of all managerial staff from the DG down to the site supervisor and the maintenance area manager. The HQ retained its authority to sign major contracts, to issue a large number of permits, to expropriate land, to purchase equipment, to construct buildings, to design bridges and major structures, to approve designs and to allocate funds for individual projects and later to procure computers, etc. An important right retained by the HQ was the right to appoint engineering staff and to settle many staff salary issues (not laborers). Many of the mid- and high-level posts were filled by the Ministry and the top posts even by the Cabinet. The role of the district was to conduct operations, to approve minor purchases according to rules and to issue medium and small contracts. The local level managers had very little administrative power. They mainly managed the operations.

The 1985 proposal for reorganization and the subsequent reorganization in 1987 delegated more authority from the Ministry to FinnRA and from FinnRA's HQ to its districts. Numerous issues related to planning, design and staff management were delegated to the districts. The procurement limits were raised and the districts were authorized to issue various road-related permits and to pay compensations, for example. The act and decree which regulated FinnRA's activities were still long and detailed, listing many staff appointment, management and operational issues.

FinnRA was reorganized again starting from January 1993. The aim of the reorganization of the HQ was to trim its size down to a core central administration. All the expert and service functions were reorganized as *Service Units*, which charge for their services. This division of FinnRA eliminated overlapping functions in the HQ, simultaneously emphasizing the financial accountability of the new units. The new smaller HQ and the road districts now act as customers to the service units. The service units finance their expenses, including staff salaries, with the income accrued from the products or services rendered to the above customers. After the reorganization, the HQ employed 120 persons and the service units 420 persons, located in the same premises.

The district organizations were developed to meet the internal division between an owner (customer) side and a producer side. Under the Provincial Road Director, PRD, these both functions work in unison. At the moment, all the districts have somewhat different organizations. In general, the owner unit is composed of the PRD's staff, administration and a support unit for R & D, contracting and auditing of production and economy. The producers are the main part of the district activities: the design, construction and maintenance of roads and the ferry operations. It covers both maintenance and rehabilitation with local maintenance area offices, the main construction projects as separate units and the "business service units" in the PRD's office. These business service units include technical services, such as the laboratories and quality measurements, field measurements, road and bridge planning and design, environmental issues, and a road materials unit for aggregate production and paving works.

In terms of delegation, the service units of the HQ and the districts are authorized to sign contracts and issue permits within their operational area, except for a few cases involving very high or long-term financial values or

overall national interests. Depending on the individual PRD, he may delegate, and has delegated, the authority to sign contracts and to issue permits to his subordinates even down to the maintenance area level. The HQ directors and the PRDs are, in principle, authorized to hire and fire staff. During the recession, the DG has retained the right to hire high-level staff, to ensure FinnRA's general staff reduction policy. For the time being, staff have been discharged only for disciplinary reasons. Retirements and retraining for new professions have been sufficient to meet FinnRA's staff reduction policy.

Box 12.

The development of the authorization for travelling is a good example of the development of delegation in FinnRA. In FinnRA's budget staff travels used to be a separate line item. The HQ directors and the PRDs issued staff travel permits for domestic trips and the DG to missions abroad and, correspondingly, approved statements of expenses.

Today, all travelling is done using the operational funds. Domestic or foreign trips are part of the operations and must be planned by the respective staff member or his/her superior as part of the annual planning. The signature of the superior is only required for the travel request if the traveller needs cash or tickets in advance. Division chiefs approve all statements of expenses

6.2 Present Decree and Standing Order of FinnRA

The attached act, which mandates the existence and organization of FinnRA, is a good example of the new managerial culture. It is short and only gives the framework within which to operate. This is also the case of the subordinate regulations and rules. The previous long and detailed statutes have been rewritten. Instead of becoming more detailed, they have become more general.

This represents the present thinking of the ways to authorize the regulation of operational and managerial issues by using decrees, standing orders, internal instructions and even agreements. In Finland the Parliament issues the acts and the Cabinet the decrees.

No 47

Act on
National Road Administration

Issued at Helsinki on January 19th, 1990

It is enacted in accordance with the decision of the Parliament:

1 §

The Finnish National Road Administration is in charge of and responsible for the upkeep of public roads and the development of road traffic conditions with related services. The Finnish National Road Administration is submitted to the Ministry of Transport.

In addition, the Finnish National Road Administration shall be responsible for other suitable tasks assigned to it by statute or the decision of the Council of State. The Ministry of Transport may also assign the Administration tasks concerning clarifications, experiments, follow-up functions and planning.

2 §

The Finnish National Road Administration has a Board of Directors elected by the State Council. The composition, tasks and term of office of the Board are prescribed by statute.

3 §

The Finnish National Road Administration has a central administration and a regional administration. The country is divided into Road Districts for regional administration.

4 §

More detailed regulations for the implementation of this Act are given in a Statute.

5 §

This Act comes into force as from March 1st, 1990.

This Act replaces the Act on the Finnish National Roads and Waterways Administration (252/75) issued on April 18th, 1975 with subsequent amendments.

Measures to implement this Act can be taken before the coming into force of this Act.

Helsinki, January 19th, 1990

President of the Republic

MAUNO KOIVISTO

Government Bill 149/89
Report of Traffic Committee 8/89
Report of General Committee 162/89

Raimo Vistbecka, Minister of Transport

The present Decree of FinnRA is reasonably brief and the valid standing order is only a fraction of the size of its predecessors during the 1970s. The Decree of FinnRA, paragraph 7, describes the role of the Board as follows;

The Board shall:

- 1) make decisions on the general operational lines and goals of FinnRA by taking into consideration the goals set by the Ministry of Transport;
- 2) decide on the administration of FinnRA;
- 3) decide on the budget proposal, the activity and financial plans, and the long-term programs of FinnRA;
- 4) monitor the execution of the goals of FinnRA, and accept the balance of the accounts of FinnRA;
- 5) decide on important research and development tasks;
- 6) issue the regulations and instructions of FinnRA unless the Board has authorized the Director General or some other functionary of FinnRA to do so; and
- 7) deal with other matters of great importance to FinnRA. These matters will be decided by the chairman of the Board.

The Director General acts as the Chairman of the Board, and the Vice-Director General as the Secretary of the Board.

Box 13.

The standing order of FinnRA, which the DG has the authority to approve, currently covers the following topics;

(a) Organization and management

It is only stated that FinnRA has the Headquarters, Service Units and Districts. The Board manages and supervises FinnRA's activities. The DG manages FinnRA with the assistance of Directors. The Provincial Road Directors manage the Road Districts.

(b) Authority to decide and act

Under this topic, it is stated that the Board issues orders covering the whole FinnRA or FinnRA's external parties. There is also an eight-paragraph list concerning the decision authority of the DG, another three-paragraph list for the Deputy Director General, an eight-paragraph list for the Directors, an eleven- paragraph list for the PRDs, and a five-paragraph list for the Deputy Directors heading the HQ or the service units. This chapter also specifies the rules of further delegation of authority.

(c) Activities and operation of the Board

(d) Appointment of staff in FinnRA

(e) Other staff-related issues, leaves of absence and collective agreements, etc.

(f) Management groups in FinnRA and in the districts

(g) Cooperation with staff

The standing order of FinnRA covers only seven pages. Many issues of delegating power and authority in FinnRA are currently treated as agreements between the superior and the subordinate.

6.3 Principles of Delegation

FinnRA's principle of delegation is to allocate decision-making authority to the level with the best available knowledge of the issue concerned. This is in line with the general aim of the Finnish Government to reduce public bureaucracy. From the customer's point of view, the decision should be made at the level where the customer contacts the public administration. To achieve good results, each operational unit should have sufficient freedom to manage and decide on its own operations. However, there has to be a legal way in a public administration to pass a complaint, or to apply for an alteration to the first-level

decision.

It may have been problematic for some managers to hand over the decisions on minor details to their subordinates. The delegation of authority leaves the high-level managers without some of the information they used to have. Today, local-level maintenance area supervisors decide on issues and are authorized to issue permits on certain matters, which ten years ago were decided and issued at a high level in FinnRA's HQ. Sufficient auditing and management systems are needed to prevent possible misuse of the authority.

7 INVOLVEMENT OF ROAD USERS

Public Participation in Planning and Design
Role of the Board of FinnRA
Road Users as Customers of FinnRA

7.1 Public participation in planning and design

Nordic societies have traditionally provided legal ways for the land owners and other interest groups to participate in the planning and designing processes of individual roads. The Finnish politically strong municipal sector and the municipal monopoly of land use planning have provided one channel for public participation. In addition to direct involvement, the general public has used political channels to influence road projects. Environmental groups have become increasingly active. The news media are often inclined to favor environmental views in reporting road planning disputes.

The Members of Parliament used to decide through the annual budgets on almost all road projects, including the division of maintenance funds between the districts. The recent budgetary development has almost entirely cut off this channel of influencing FinnRA (see chapter 2.). However, the role of the MPs and the Parliament as the main financer of FinnRA has remained very important. Participation at the municipal level is increasing. FinnRA has improved its road plan presentation techniques and people are actively invited to planning meetings and plan presentations. The time span from the original road initiative through planning and design to construction has continued to increase. The number of interest groups which participate in road sector long term planning is also continuously increasing.

The new organization of FinnRA has allocated more participatory responsibility to the districts. All long-term plans have always been submitted to certain public and private interest groups for their opinion. Currently, the responsibility for interest group interaction is also shouldered by the districts. Apart from the municipalities, the County Leagues are the most important interest groups for FinnRA. The County Leagues are politically elected regional organizations which coordinate the regional interests of municipalities. The leagues also have regional planning functions, which they use to influence the district level road sector planning process.

Box 14.

FinnRA's Road Plan for 1995–2004 has been presented to the following groups for their opinion.

- (a) Government organizations, apart from the parent ministry, the Ministry of Transport and Communications
 - Seven ministries
 - Seven public administrations
- (b) Federation of Municipalities and all County Leagues
- (c) Eleven other public organizations, including
 - Main research institutions and universities
 - Tourism promotion center
- (d) Seventeen interest groups involved in various stages of the road management process, including
 - Groups promoting non-motorized transports
 - Chambers of Commerce and industrial organizations
 - Traffic safety and insurance organizations
 - Environmental organizations
 - Unions of contractors, consultants and trade organizations
 - Organizations of societal and futurist planning
- (e) Ten road user organizations
 - Automobile Association
 - The Finnish Road Association (IRF affiliate)
 - Truckers' union, bus transporters' union and other transport modal unions
 - Association of petrol companies

7.2 Role of the Board of FinnRA

In order to institutionalize user participation in road management and to provide business life a formal channel to contribute to the decisions from the inside, a management board was established into FinnRA in 1990. The paragraph of the decree in which the tasks of the Board of FinnRA are stated is printed in chapter 6. The first justification for the creation of the Board was the increased need to involve the general public in road sector development, the increased environmental pressures, the need for improved transport efficiency and economy, and the need for more open planning of the road network. The second aim was to separate the coordinating road policy management from the operational management. The third aim was to bring the Ministry of Transport and Communications to directly participate in FinnRA's managerial system.

Box 15.

The Board's role is (a) to bring in the operational and national policy issues spelled out by the Parliament, the Cabinet and the Ministry, (b) to establish connections between the traffic policy and the general socio-economic policies in Finland, and (c) to air the views of road users and (d) the main staff unions of FinnRA.

The eight-member Board has two representatives of the road users. One of them is the director of the Confederation of the Finnish Industries and Employers. Industry is the main source of heavy transports and the most influential part of the Finnish economy. The other member is the manager and owner of a large family-owned trucking company, representing in the Board the truckers of Finland.

7.3 Road Users as Customers of FinnRA

The direct involvement of the common road user in road management has always been the tax payer's thankless role. The most brave ones used to complain in the Letters to the Editor columns in newspapers. During the 1920s and 1930s, the Finnish papers were full of articles on the poor condition of the roads. By now, the number of reasons for complaining of the poor condition has been reduced. Articles of this type may still appear in provincial papers. The topics of newsprint writing vary widely from the need for new roads or road signs to opposing roads and motorized traffic.

Finnish people use their right to write directly to FinnRA and its DG or the PRDs to complain of (or praise) FinnRA's actions or the conduct of its staff. Complaints are also addressed to the Ombudsman and even to the President of the Republic. FinnRA has a direct telephone line for people to ask for information and to give feedback.

The Finnish Automobile Association (FAA) represents only about 61 000 of the almost 2 million private car owners. This is a low figure compared to the Norwegian association with 0.45 million members. For example, the FAA used to have during the earlier stages of motorization, a more representative position as the voice of the road users than it has today. FinnRa has a mandate in the advisory board of the FAA. The FAA is often in line with FinnRA's proposals and programs, supporting FinnRA's efforts at better better roads. The volunteer road rescue associations which patrol on the highways, assisting people with vehicular problems, are closely related to the FAA or cooperate with them. During the weekends of Christmas, Easter, mid-summer etc., these organizations assist road users, cooperating with FinnRA's maintenance crews.

The Finnish Road Association (FRA), which is affiliated to the International Road Federation (IRF), is a small organization promoting better roads. Its membership is composed of 2200 individuals and 200 corporate members. Its main role, from FinnRA's point of view, is to provide an independent forum for road policy discussions and to influence on decision-makers, politicians and the media for the benefit of the roads. The FRA organizes regular winter road congresses and domestic road research seminars. Both the FRA and the FAA publish their own membership magazines.

The involvement of its direct customers, the road users, has been a big problem for FinnRA. The image of FinnRA has been technocratic, bureaucratic and distant to the road user. To obtain information on the needs of the real road users, a number of surveys were conducted during the late 1980s and early 1990s. Most of the surveys were conducted by the Gallup of Finland. In one case, a special deep interview technique was used to interview a limited number of interviewees. FinnRA also acquired a license for the conjoint analysis technique to conduct its own specific customer surveys. The results of the surveys are extensively discussed in FinnRA's management at all levels and published in internal papers. Today, FinnRA is using prominent individual road users, people who have experienced traffic accidents, etc., as lecturers in internal training and seminars, to sensitize their staff to outside opinions.

Simultaneously with the first user surveys, a new logo was designed for FinnRA. FinnRA's information spots started to appear on the TV, and the staff were trained in customer relation issues. FinnRA has now an information unit and a road and traffic information center, which provide user information on the road and traffic situation along the road network, the winter road conditions, road works, etc. The media used are the text-TV, the radio, information monitors at petrol stations, booklets, maps and a direct telephone line for road users. The pay telephone number is also a road user channel for direct feedback to FinnRA. The image of FinnRA has clearly improved since the time of the first surveys. A comprehensive, but focussed survey gives important information to a public organization on its weak points and strengths. It is an important managerial issue to interpret the results and to implement the necessary changes suggested by the surveys.

8 ORGANIZATION AND PERFORMANCE OF FINNRA'S OWN EQUIPMENT

Tradition of the Use of Equipment

Plant Pool

Planning for the Need of Equipment

Development of the Use of In-House Equipment

8.1 Tradition of the Use of Equipment

The mechanization of FinnRA's works started during the 1920s. But the main impetus to mechanization was given by the first World Bank road loan to Finland in 1964. As suggested by the Bank's and FinnRA's policies at that time, all equipment were procured for FinnRA's direct labor. Between 1964 and 1967, altogether 512 graders, 28 full crushing plants, 700 heavy trucks and 475 tractors with loaders and excavators were added to FinnRA's equipment fleet. In 1968, FinnRA had 1150 heavy-duty trucks, 900 graders and more than 800 tractors. FinnRA's equipment were used for maintenance and minor rehabilitation works. In practice, 80% of the road maintenance equipment in the early 1970s were FinnRA's own, and 20% of the maintenance work was done using contracted equipment.

Box 16.

Principles of FinnRA's Equipment Policy in the 1960s and 1970s.

- (a) The number of FinnRA's own equipment shall be sufficient to safeguard maintenance operations along the main road network.
- (b) The maintenance workload should ensure a sufficiently high utilization rate for the equipment and
- (c) Even in the remote areas, there should be a sufficient number of equipment available when needed.

Because the equipment were bought using a special line item for new equipment in the Government's annual budget, they were used as a free commodity by the maintenance managers. Heavy equipment were used for secondary tasks, cost consciousness was poor, the cost calculations did not include all costs, and the calculation of depreciations and write-off periods was not well developed. FinnRA's management encouraged the invention boom, which spread over the district organizations during the 1960s. Graders, tractors and trucks were equipped with brooms, grass mowers, salt spreaders for summer (dust prevention) and winter (de-icing), bush cutters, line painters, sign cleaners, snow removers, ice scrapers, etc. etc. Many of the invented devices

were produced in FinnRA's own workshops. These devices added to the number of annual working hours and involved the risk that heavy, expensive equipment was used for secondary assignments.

8.2 Plant Pool

A Plant Pool (The translation of the Finnish name is Equipment Bank) was created by FinnRA in 1971 to improve the accountability of equipment management. The goals of the Plant Pool were as follows:

- (a) To register all equipment-related costs to the end-user or the final product.
- (b) To adjust the procurement and management of equipment to FinnRA's goals and managerial principles.
- (c) To improve the efficiency of equipment management and to keep the unit rates of equipment at a competitive level.
- (d) To rent equipment and sell related services at competitive rates and
- (e) To ensure equipment productivity and a sufficient return rate on the capital invested in equipment.

The Plant Pool was organized in the districts and the Provincial Mechanical Engineers were appointed managers of the district Plant Pools. All major equipment belonged to the Plant Pools. The operators in the maintenance area offices were subordinate to the maintenance supervisor. The equipment were rented to maintenance area supervisors, the first-level maintenance managers of FinnRA, on an hourly, daily, weekly or monthly basis. The depreciation of equipment and buildings and some other cost elements were calculated and billed together with the fiscal expenses to the end-user. The accounting system at the end of the year balanced the differences between the fiscal expenses and the total costs.

The use of a Plant Pool accounting system ensured that the costs of FinnRA's production could be compared with the production costs of private contractors. The system has produced accurate, even individually specified, reports on the use of equipment, production and cost data, repair costs, fuel consumption and effective working hours. This has given a good basis for further equipment investments.

FinnRA had 14 major workshops and still continues to have about 200 maintenance bases and sub-bases with equipment service facilities. There are sufficient spare parts, engines, gear boxes, etc. in stock for standardized equipment. FinnRA has established an internal system of service limits and preventive replacement of key parts in the major equipment.

8.3 Planning for the Need of Equipment

The need to develop planning for the use of equipment and equipment investments became more and more acute when more information became available. Two long-term resource plans were prepared during the 1980s, the later one for the period from 1987 till 2000. These plans were based on FinnRA's tradition of using its own equipment in most maintenance works. The aim was to improve equipment productivity. The technical development had rapidly increased the productivity of equipment. For example, the transport capacity of FinnRA's trucks had doubled within ten years despite the simultaneous 15% reduction in the number of trucks. It has been estimated that equipment productivity will continue to increase by 1 to 2 % per annum.

To calculate the target number of various types of equipment, a calculation model was developed based on the rate of return of the use of equipment. The other calculation principles were (a) a reduction in the number of equipment and operators, (b) use of contracted equipment during work peaks, (c) an increase of the effective working hours of FinnRA's own equipment to reduce their unit rates, (d) a reduction in the number of equipment to reduce the need for garages and other buildings and administrative work. The final proposal was based on the security of the key maintenance operations using FinnRA's own equipment, especially the winter maintenance of the main roads, and the availability of the contractors' resources using multi-year agreements. The policy was to ensure the contemporary service level of maintenance operations.

In 1987, a project team working under the Ministry of Finance (MF) produced guidelines and calculation examples for investment calculations within the Government, in order to compare the agencies' own operations and external services. The guidelines specifically quantified the two basic alternatives;

- (a) Services which have been bought or produced by a contractor are taken over by the task force and
- (b) The services are currently produced by the public organization, but similar services can be procured from the private sector.

Four different calculation methods were presented, namely;

- (a) Discounting the investments to the present value,
- (b) Calculation of the annual installments vis-á-vis annual profits
- (c) Calculation of the internal rate of return, and
- (d) Calculation of the benefit-cost ratios.

The MF booklet used contracted versus direct-labor road maintenance works as an example in testing the sensitivity of the different cost factors. The examples revealed that the contemporary unit prices, i.e. the governmental rates and the contractor's tender prices, seldom gave sufficient information to allow the choice of the optimal alternative. All the calculations are very sensitive to the interest rates, the writing-off periods and the salvage values of the

investments. An important issues is how the present public resources can be re-allocated or released and at what cost. However, when a major equipment is to be scraped or a maintenance base or warehouse is to be built, an investment calculation should always be made on the alternatives of how to procure the necessary service.

8.4 Development of the Use of In-House Equipment

The development of the number and use of FinnRA's equipment is summarized in the following table. The columns tell the number of equipment registered in FinnRA's Plant Pool in 1977, 1987 and 1994. Usage is expressed as utilization %, which shows the effective working hours relative to the total number of working hours per year, which is about 1950. Age is the average age in years and months (years.months) of all equipment in this category. Maintenance percentage is the percentage of the working hours of FinnRA's own equipment in road maintenance out of all equipment hours in this category in 1993. Plan 2000 shows the planned need for FinnRA's own equipment in the year 2000.

Development of the number and use of equipment in FinnRA

The number of all working hours is 1950/annum in the usage calculation.

Type of equipm.	Nos 1977	Nos 1987	Use% 1987	Age 1987	Nos 1994	Use% 1993	Age 1994	Plan 2000
Light truck	27	219	66	4.05	203	58	5.08	150
Heavy truck	1122	920	76	5.05	813	77	6.04	500
Vans	271	350	61	4.06	406	57	4.10	150
Graders	774	541	50	7.10	463	48	7.08	400
Wheel loaders	125	186	54	7.06	225	40	7.00	150
Tractors	632	336	33	7.00	233	26	8.02	150
Excavators	-	58	34	9.04	12	22	13.11	-
Total	2951	2610			2355			1500

Despite the reduction in the number of equipment, the utilization has not improved. The size, efficiency and performance capacity have been continuously increasing. This has made it possible to produce more and more with a single piece of equipment. The cost consciousness of the maintenance managers has improved, resulting in the use of equipment only in productive assignments.

Box 17.

Corporatization of FinnRA's Workshops

The Government of Finland has established a state-owned public enterprise, which took over all of FinnRA's 14 district workshops starting from July 1st, 1994. A number of other government agency workshops were included in the same company. Using FinnRA's workshops as the nucleus of the new company, this enterprise will provide maintenance, repair and other workshop services for heavy equipment all over Finland, including FinnRA and other public administrations.

9 POLICIES ON WORKS EXECUTION

Evolution of Works Execution
FinnRA's Production Organization
Road and Bridge Construction
Road Maintenance

9.1 Evolution of Works Execution

Historically, Finland has a long tradition of road works execution by private contractors ever since the 18th century. The traditional works execution was based on auctioning sections of roads to private contractors for a number of years. Gradually, large contracting firms began to undertake works along long sections of the main roads, and minor roads were contracted to lengthmen type of petty contractors, usually local farmers. The system worked reasonably well, though not without numerous legal disputes, until the growth of traffic during the 1930s. The labor-intensive methods of work of the small contractors were no longer sufficient to retain the needed quality and traffic condition of the roads. The terms of contract agreements, the growth of traffic, the unpredictability of weather conditions, frost thaw problems, etc. caused heavy losses to the contractors. Road users also complained of the poor workmanship of the contractors. Consequently, some of the major contractors refused to tender any more for road maintenance works. The contracting of road maintenance works practically ended before World War II. Contracting of ferry operations continued until the early 1970s and then ceased gradually under pressure from the trade union. This development speeded up the development of FinnRA's own management of roads and works execution by task force.

9.2 FinnRA's Production Organization

After World War II, the road districts and the construction sites, the design projects and the maintenance areas subordinate to them acted as production organizations under the HQ of FinnRA. The 1960s was a period of fast technical development. In order to strengthen their professional specialization and production capacity, FinnRA was organized into three production lines: planning and design, construction and maintenance. The previous sub-provincial production managers, who had conducted all the activities within their areas, were appointed to head a single activity over the whole district. In addition, the district offices had a workshop and stores division and an administrative division. FinnRA's HQ had units, departments or divisions, corresponding to the production lines in the districts.

The production line organization had a number of advantages in a production-oriented administration.

- (a) The production line staff developed high-level technical specialization in their own fields.
- (b) Technology was developed to meet the production needs.
- (c) FinnRA's management had direct line contacts to the field operations and the production could be directed and developed to meet the needs of FinnRA's management.
- (d) The organizations were similar in all of the districts and it was easy to compare the districts with each other (see chapter 5).
- (e) Production information was uniform and gave good opportunities to develop managerial information and auditing systems.

9.3 Road and Bridge Construction

The extensive road network reconstruction works from the late 1950s till early 1970s required large equipment fleets. FinnRA had few equipment of its own. Most of the construction was performed by small contractors and self-employed truck and equipment owners under FinnRA's project management. The World Bank road loans to Finland expedited the development of contract and works documentation. Increasingly large-scale road construction projects were contracted out, mainly to domestic contractors. During the 1970s, FinnRA's HQ had a policy of advocating large road contracts, partly as a promotion for developing the competitiveness of Finnish contractors on international markets. As a result, Finnish road contractors have successfully executed large works in Africa, the Middle East and the former Soviet Union.

On the domestic market, some contractors had quality and financial problems, despite the sufficient price escalation clauses in the contract documents. As a precaution to avoid possible problems in the contractors' performance, FinnRA had a contractor register, which classified the contractors as to their technical, financial and quality performance. This register was used for prequalifying capable contractors.

FinnRA's active research and development work improved its task force work performance capacity. FinnRA also took the advantage of contractor specialization and price competition by contracting works increasingly by work items. The contracting of long sections of roads has now almost come to an end. FinnRA's staff has systematically developed contract management skills and methods. FinnRA now takes advantage of the specialization and knowhow of the contractors in their own fields. In bridge construction, the contracting of a series of bridges of a given type has improved productivity. In asphalt production, FinnRA still has two asphalt plants, some cold mix plants and a few crushing plants and bridge scaffolding, but no other construction equipment.

Percentage distribution of the costs of road maintenance, construction and bridge works in 1993.

	Direct Labor	Plant and equipm	Trans- port	Mater- ials	Con- tracts	Others
Road maintenance	30	11	10	16	23	10
Road and bridge construction	14	5	5	12	59	5

The development of contract documents has proceeded from the traditional description of acceptable methods of executing work items to the description of the end products. It remains more and more at the discretion of the contractor to choose the method of works and quality control and to prove the end products' quality. Contractors are encouraged to develop their own methods and even to tender alternative proposals. There is a system of splitting the gains achieved between the owner and the contractor. The bonus system may grant financial benefits to the contractor for improved quality. In case of poor quality, the contractors carry the penalties. One method of shifting the responsibility from the owner to the contractor is the extension of the warranty period.

Disputes have arisen between FinnRA and the contractors due to the possibility of FinnRA's force account to submit an "in-house" tender in an open competition. The rules for in-house tendering and the comparison of an in-house tender against the contractors' tenders were prepared during the mid-1970s. Initially, the complaints of the contractors were targeted at the correct costs of FinnRA's own equipment and staff and capital expenses. In Finland's small national economy, there is a risk of monopolies and cartels in contracting. therefore FinnRA's own tender, or even the possibility of FinnRA's tendering, has prevented price escalation.

The design of roads also used to be in-house work. Consultants were used in large projects, network development evaluations, and projects involving municipalities and other parties in addition to FinnRA. The use of consultants has slowly increased since the early 1970s. The policy is to retain the planning of the network, the road location planning and the design policy issues in FinnRA and to procure road and bridge design from consultants. Another trend

is to shift construction planning and the final designing of structures from the design process to the construction process to be carried out under the construction site manager.

9.4 Road Maintenance

In road maintenance, traditional contracting was limited to asphalt works, aggregate production, snow clearance in winter and specialized works beyond the competence of the maintenance area staff, such as electrical, mechanical and gardening works. It was considered the responsibility of FinnRA to perform maintenance works by force account at least along the main highway network. The number of FinnRA's own equipment and the competence of its own staff made this possible. FinnRA's own operations gave direct access to equipment and method development. A good example of FinnRA's equipment and method development is winter maintenance as a whole. For more details, see also:

Winter Road Maintenance Methods in Finland, FinnRA, R&D Unit, Tampere, Tapio Raukola et. al., Helsinki 1993, ISBN 951-47-8115-5.

Contracting experiments gradually expanded to larger works and multi-year contracts of winter maintenance operations, including weather monitoring by the contractor. Some of the road districts are currently testing maintenance contracting of large geographical areas up to the size of a whole road maintenance area. The strategic thinking beyond maintenance contracting is:

- (a) In-house maintenance units are exposed to competition to an extent that creates sufficient pressure for them to improve productivity.
- (b) Favorable options are offered to the maintenance staff to exploit their professional and business skills as either independent contractors or "internal contractors" with total responsibility for a certain area or works.
- (c) In-house administrative and management procedures are developed to promote productivity and efficiency.

There is also a long list of problems to be solved in expanding maintenance contracting, including poor knowledge of maintenance by outside contractors, definition of the lengths of the contract periods to give sufficient write-off time for the equipment, insurance and taxation problems, quality measurement, weather and other risk clauses, performance of emergency works, etc.

The share of works contracted by FinnRA (procurement of works, consultancy assignments and other external services) increased until 1991. The current practice, which favors in-house project management and splitting of works into moderate size contracts, will continue to increase competition in the reasonably small domestic market. Depending on the rate of reduction of FinnRA's own staff, the contracting of works will gradually increase.

10 AUDITING OF PERFORMANCE

Governmental Auditing System

Internal Inspection

FinnRA's Internal Audit

10.1 Governmental Auditing System

The Finnish governmental auditing system is divided into external and internal auditing. The ministries are the first-level external auditors of the administrations. Special external auditing is carried out by the State Auditors and the Government Auditing Office.

The Finnish Parliament appoints 5 of its members as State Auditors. On behalf of the Government, and with the assistance of a small staff, they supervise the materialization of the Budget and the state of the financial affairs of the Government. Their duty is to audit both the legality and the appropriateness of the use of governmental funds. They use the material provided to them by the Government Auditing Office and their own staff. The State Auditors visit the administrations on a random basis, and once a year they submit a report on their findings to the Parliament.

The Government Auditing Office audits the administrations by:

- (a) Inspecting the accounts and finances of the administrations and their use of Government properties.
- (b) Auditing the compliance with the State Budget and related finance laws, statutes and orders.
- (c) Auditing the appropriateness of the management of public finances. The focus has recently been shifted towards the results and effects of the administration and the reliability of information.
- (d) Ensuring, from the auditing point of view, the principles of good governance in administration.
- (e) Instructing the administrations in auditing and developing the auditing especially in relation to new management and organizational systems.

Minor defaulters will receive a notice in writing and a request to rectify the default. In case of major irregularities or non-compliances, the violator will be given a possibility to a written written explanation before any further actions.

10.2 Internal Inspection

Internal inspection in FinnRA is considered an integral part of the management and control process. The planning and the plans constitute the basis for control. The management control tools consist of operational accounting, internal

inspection and internal auditing. Most of the managerial control is, in practice, internal inspection.

Internal inspection is based on the functional organization, the delegation of authority and the assignment of tasks. Internal inspection is a built-in part of the daily operations and work routines. It is an automatic control rather than a separate unit in the organization.

Box 18.

For internal inspection, a good organizational setup requires;

- (a) a functional organization chart
- (b) a well-planned distribution of tasks, with possibilities to job rotation if necessary
- (c) delegation of power and authority
- (d) systematic authorization to conduct financial and business transactions
- (e) sufficient plans, programs, estimates and operational frames
- (f) effective computing, accounting and reporting systems
- (g) job descriptions for key staff
- (h) sufficient tools to accomplish assignments
- (i) training and information and
- (j) managerial control and external and internal auditing of the inspection system.

Internal inspection is a follow-up tool for managing the efficiency and profitability of an organization. It is vital in preventing mistakes and misconduct. The technical issues of quality, timeliness of operations, cost control, etc. are considered by FinnRA to be part of the internal inspection, not auditing.

10.3 FinnRA's Internal Audit

Internal audit in FinnRA is a separate unit independent of the other units of the organization. It is assigned by the management to audit the other units within the organization. Auditing differs from inspection in that it is conducted by a separate unit or person instead of the executing unit. The executing unit only inspects its own operations. Auditing is directed at actions conducted by units or persons other than the auditor. In most cases, auditing takes place after the completion of an action, including the inspections built in the action.

There was not much difference between inspection and auditing in FinnRA until 1976. The reorganizations since the mid-1970s have developed FinnRA's auditing more and more towards being a management tool. The traditional auditing of book-keeping and accounts has remained on the list of duties for the auditors. However, the focus has been shifted towards principal issues, legality and appropriateness of actions, managerial analyses and the reliability of information, training and information to prevent mistakes and, finally, towards the results of the operations.

Box 19.

FinnRA's management uses auditing to ensure that:

- (a) The goals of the functions and units are in line with the goals of the administration, the resources are properly distributed and the internal planning and budgeting is appropriate.
- (b) The parameters and criteria represent correct issues.
- (c) The organization operates in compliance with the agreed values, principles and instructions.
- (d) Problems, bottlenecks, free capacity and development needs are revealed.
- (e) Internal inspection is well organized.
- (f) Accounting and follow-up systems are appropriate and reliable, and the produced information is used in making decisions.
- (g) Works are executed in accordance with the original agreements.

FinnRA's Auditing Division is a small unit of 7 persons. In the organization, it is directly subordinated to the Director General (DG). Each district has one or two auditors subordinate to the Provincial Road Directors (PRD). FinnRA's auditing operates in accordance with the above principles as a managerial instrument for safeguarding the credibility, profitability and lawfulness of FinnRA. The auditing operations are based on an annual plan, approved in the case of the HQ by the DG and in the districts by the PRD.

There are certain separate auditing type of issues, which are sometimes called auditing in FinnRA, but are not connected to the traditional auditing process. A typical issue of this type is the auditing of quality, which will be discussed in more detail in the next chapter. Another process of the auditing type is the environment impact assessment (EIA), which is needed before the execution of any major projects. Additional examples include the safety auditing of new road designs and the auditing of maintenance quality and the timeliness of maintenance operations. The above examples of auditing type processes are part of the management process in FinnRA.

11 QUALITY MANAGEMENT

Quality in Road and Bridge Construction

Quality of Road Maintenance

Total Quality Management

11.1 Quality in Road and Bridge Construction

Traditionally, quality and quality control have been connected to construction and contract supervision. The control has involved control of evenness, density, bearing capacity, etc., as is the practice all over the world. During the 1960s and 1970s, FinnRA developed a penalty system to promote better performance by the contractors. This was first used in asphalt paving works and gradually extended to crushing of aggregate, bridge works and finally to other road construction works. The main weakness remained in task force works, where quality auditing was an internal issue. The treating of defects depended on the practice within the district. The results on the task force construction quality and the contractors' work quality were collected and compiled by the site and district laboratories on request by the Geotechnical Division of the HQ. The compiled reports were discussed in the annual meetings of the construction managers. However, for the task force works this approach did not have the same effect as the penalty clauses in contract documents. It should be pointed out, though, that there was no statistical or other evidence of quality differences between the task force and the contracted works.

As a consequence of the recent organizational developments, quality management and quality control responsibility for task force work will be carried by the "owner" part of the organization, not the task force producer itself.

In contracted works, the trend is towards the contractors' own quality management and control. FinnRa is currently testing a construction practice where the contractor provides a quality management plan and conducts the necessary quality measurements and tests. In this case, FinnRA or the engineer only conducts random sampling and spot checking. The system, which is called Total Quality Management (TQM) or Total Quality Contracting (TQC), first started in its present form in bridge construction. The aim is to provide uniform, homogeneous quality and to encourage the contractor to produce good quality. The results of individual quality measurements are computed, using an expert system, to produce one overall quality index for structures and civil works. On the basis of this index, the contractor can receive a quality bonus worth up to 5-6% of the contract sum. In practice, the bonuses of completed works have ranged within 1-2%. A contractor may receive a general bonus for the quality of the overall works and simultaneously a penalty for a single defective work item. Gradually, all the contractors are required to develop their own quality systems and to present a quality management plan before executing a project for FinnRA.

FinnRA's present TQM/TQC system was presented in more detail in the congress proceedings of the IRF XII World Road Congress, Madrid, Spain, May 1993.

Advancing from Quality Control towards Quality Systems, Mr. S-Å. Blomberg, FinnRA, Turku Provincial Road Administration; IRF 1993, Congress proceedings ISBN 84-88661-06-01, Part 2. Session 3.

11.2 Quality of Road Maintenance

The measurement of the quality of a road and especially its runway is an essential element of maintenance performance evaluation. The outcome of maintenance operations is, in most cases, a new higher level of quality. The quality in road maintenance is an end-result experienced by the customer, the road user. In maintenance, quality management covers all the measures needed for timely production of the quality described in maintenance specifications. In FinnRA's result management and in its production agreements between the HQ and the districts, maintenance performance is described as a quality (condition) of the roads. Some maintenance quality items were even amongst the Government's annual targets for FinnRA.

Only a few of the maintenance products can be measured using the same quality specifications and measurements as in road construction. Many of the maintenance actions, such as gravel road levelling or pothole patching, cannot be feasibly measured using the same density, evenness, material quality or other specifications as are used in road and bridge construction. The time factor is a maintenance-specific quality item. It is the time period allowed for maintenance crews to restore the condition of a defective road. Monitoring of the maintenance quality is done internally in FinnRA, often by the district responsible for the maintenance operations and not by external auditors or institutions. Even when the maintenance quality is the same as the service quality experienced by the road user, there are very few practical ways of using road user estimation in evaluating maintenance quality. One random method of sampling is to record user complaints on FinnRA's user information telephone. Some of the main maintenance work items and the respective quality measurements are described in Annex 5 under the title Auditing of Routine Maintenance Quality.

Quality measurements are used in the production agreements between each district and the HQ (DG). In an agreement, the different variables are summed up into a few comprehensive quality parameters. For more detailed information, the following English language booklets are available concerning FinnRA's quality monitoring. The first one is on the evaluation of hot mix pavement and bridge conditions in periodic maintenance type operations, while the latter two deal with routine maintenance activities;

Infrastructure Management System, Preparation of case-study, FinnRA and the EDI/World Bank, FinnRA Research Reports 4/1993, ISBN 951-47-8102-3, Helsinki 1993.

Routine Road Maintenance Management and Monitoring at the Finnish National Road Administration, Mr. Olli Penttinen, FinnRA, Helsinki 1994.

Quality Monitoring in Winter Maintenance Management at the Finnish National Road Administration, Mr. Olli Penttinen, FinnRA, Helsinki 1994.

11.3 Total Quality Management

FinnRA's Total Quality Management (TQM) system is based on the ISO - 9000 standards series. When finally fully imported to all staff and adopted by the organization, the TQM will:

- (a) Cover the whole organization, both administration and production, including responsibilities, procedures and actions needed to produce good results and products. It aims at preventing the production of defective quality in advance.
- (b) Embrace FinnRA's organizational structure, responsibilities, procedures, processes and the resources needed to produce acceptable quality products.
- (c) Be described in a quality handbook, which is a written description on how the units should prepare their quality plans and how they can ensure good quality in their products.
- (d) Set goals for a further development of the organization.

The quality system is a result management tool. It describes the quality of the activities, production and administration, and the processes intended to achieve good quality. It is aimed at improving the competitiveness of the organization and at helping in managing changes and development. It brings together the staff to develop their own work.

Quality responsibilities are pointed out in the individual quality systems of each unit and further defined in the organization schemes, job descriptions and/or quality plans of the projects, so that:

- the notion of quality is defined in such a way that it becomes manageable
- the motivation and competence of the staff improves
- the production of defective quality is prevented in advance whenever possible,
- quality deviations are identified and treated already during the work process,
- remedial measures can be taken immediately and
- the success of the remedial measures is ensured
- productivity improves and
- the trust of clients improves.

When completed, FinnRA's Total Quality System will be composed of the following parts:

- (a) Quality Handbook
- (b) Quality instructions (in the HQ, Service Units and Districts)
- (c) Works specifications (in the HQ, Service Units and Districts)
- (d) Reference documents (laws, acts, standards etc.)

The content planned for FinnRA's Quality Handbook is presented in Annex 6. For each district and their maintenance areas, FinnRA has prepared guidelines on how to prepare a local maintenance quality system. It is vital that the quality system is prepared by the unit and its staff, not by an external consultant. This is the only way to ensure ownership by the staff. The district quality system is composed of operational instructions, descriptions of the quality of the final products, the available resources and the way the system is audited. At the maintenance area level, the quality system describes how the product/work should be done.

The quality system has its own auditing, which differs from traditional auditing. Quality auditing is functionally related to internal managerial inspection. In quality auditing, the operations are compared to the quality system documents and the quality deviations are recorded. The reasons for deviations are analyzed, and the unit takes remedial actions to avoid deviations in the future. In FinnRA, quality auditing is conducted as part of the result discussions between the district management and the maintenance area manager. FinnRA is also considering the possibility to establish a formal road maintenance quality auditing system based on the ISO standards. There is, however, the practical problem of finding independent auditors sufficiently familiar with road maintenance from outside FinnRA. One possibility under consideration is to nominate a person from one district to audit maintenance performance in another district.

Quality auditing and performance evaluation (chapter 5) are used side by side. An organization which almost has a monopoly in its country has problems in finding comparative counterparts to measure the real quality of performance. The use of customer satisfaction evaluations has been one of FinnRA's tools. Related to TQM, FinnRA will test its position in international quality management by participating in the Malcolm Baldrige National Quality Award competition. One of FinnRA's districts has been selected to produce the required documentation to the award commission.

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ANNEX 1**TERMS OF REFERENCE**

This report has been prepared as part of consultant assistance services called "Assistance to Road Maintenance Initiative (RMI) Policy Reform Facilitation in Tanzania, Zambia and Kenya". The key objectives given in the Terms of Reference, submitted to the author on May 4, 1994, can be summarized as follows:

- (1) To undertake a detailed review of the management of roads in Finland and Sweden, in particular with respect to the following issues:
 - Involvement of road and road transport users in the management of the road sector.
 - Extent of decentralizing management, authority and responsibility. Requirements for successful decentralization and benefits involved.
 - Improvement of the productivity of the Government's own equipment; how and with what results ?
 - Improvement of the efficiency of works execution; how and with what results ?
 - Financial and technical audits to ensure that the funds are spent as programmed and provide value for money.
- (2) To present the results of the review at workshops/seminars to be held in Kenya, Tanzania and Zambia in 1994.

The basic idea with this and similar assignments is to outline how we, in the donor countries, are financing and managing our road infrastructure. We certainly have some valuable experiences to share. Occasionally, however, what we propose they should do is not the same as we do in our countries. Even so, with a fair outline of our institutional setup and developments as well as our socioeconomic environment as seen from the Sub-Saharan perspective with the local problems and challenges, we might be in a better position to explain the differences. Comprehensive information on our own situation will probably always add weight to our proposed options for reform, regarding both governments and donors.

ANNEX 2**REPORTING OF THE FINANCIAL ACTIVITIES OF FINNRA**

Currently, FinnRA prepares an annual balance sheet and an income statement and calculates some twenty basic economic ratios. Because FinnRA is a governmental agency functioning under the budgetary control of the Parliament, this statement is only an internal report to FinnRA's parent ministry, the Ministry of Transport and Communications. The nine districts of FinnRA prepare similar statements of their own activities. These financial statements are an integral part of their annual result reports to the Director General of FinnRA.

There are a number of ways to explain the expenses of an organization. The following two ways are used by FinnRA:

Administrative Division of FinnRA's Road Management Expenses: (costs of 1993 in million US\$, 1 USD = 5.3 FIM)

General Administrative Expenses	105
Basic Road Management, Maintenance and Minor Improvements	
Routine Maintenance	200
Periodic Maintenance	210
Minor Improvements	100
Traffic Safety and Road Environment Improvements	87
Planning of the above Projects	34
Purchasing of Ferries	5.5
Road Network Development Costs	
Development of Main Roads	191.5
Development of other Roads	61.5
Planning and Design of Network Development Projects	33
Change of Materials Stockpiles	6
Special Employment Projects for the Ministry of Employment	25
Land Expropriation and Compensations	36
Separate Chargeable Activities	
Domestic Chargeable Activities	5
Export Services and Finnida's Development Projects	6.5
Total Road Management Costs	1106

The income side in FinnRA's income statement has basically two main items, (a) new roads opened for traffic and (b) road maintenance and traffic services performed during the year. New completed roads in FinnRA's financial statement are equal to the completed works handed over to the clients in the contractor's

income statement.

Another way of explaining the costs of Road Administration are the operational expenses in the income statement and the balance sheet.

FinnRA's Operational Expenses in 1993 (million US\$)

Salaries and Salary Related Social Expenses	291.5
Travel and Accommodation	24
Rents and Leases	15.5
Materials and Supplies	127.5
Soil Materials	2
Purchase of Minor Equipment (value per item less than US 10000)	11.5
Land Acquisition	36
Contracted Works	371
Consultancy Assignments	43
Contracted Equipment and Transports, Other External Services	136
Services to other Internal Organizations (an equal sum in the income side of the statement)	10.5
Ferry Purchases	5.5
Change of the Value of Material Stockpiles	6
Change of the Value of Completed Road Design Works	5
Change of the Value of Uncompleted Construction Works	57
Depreciations: Equipment x)	22
Buildings	7
Total Operational Expenses	1171

x) All equipment purchases worth over 10 000 US\$ and all new buildings are included as assets in the statement of financial condition. The depreciations appear as a cost in the income statement.

The following key ratios present an example of the ratios in FinnRA's financial statement of the year 1993:

Return on Invested Capital (ROIC %)	9.5
Profit Percentage of Revenues from FinnRA's Activities	8.4
Velocity of Circulating Invested Capital (revenues/invested capital)	1.12
Wages and Salaries per Person (in thousand dollars)	30
Value Added per Person (in thousand dollars)	46
Inventory turnover (times/year)	1.8
Value of unfinished roadworks/Invested capital (%)	30.9
Value of completed road designs/Inventories (%)	32

ANNEX 3**CONTENT OF THE CONSTRUCTION INFORMATION SUMMARY OF FINNRA**

FinnRA's annual construction performance information compendiums, which were compiled during the 1980s, generally covered the following topics. These compendiums were used as a basis for the annual result discussions between the HQ and the districts and within the districts. The same information was used in FinnRA's annual statistics.

- (a) Comparison of the results of all construction activities vis-à-vis the annual objectives;
 - Construction economy
 - Quality of construction
 - Staff motivation development
 - Results of development projects
- (b) Comparison of districts
 - Construction economy
 - Unit price development
 - Development of overhead costs in construction
 - Evenness of new roads
 - Bearing capacity and compaction of layers
 - All the above summarized in one quality rating score for each district.
- (c) Quality of construction
 - Evenness
 - Bearing capacity and compaction
 - Quality of bridges
 - Quality of crushed stone material
- (d) Construction economy and productivity
 - Development of construction economy during the past 10 years
 - Unit price comparison
 - Development of production economy measured using a translog index (see 5.3)
 - Development of bridge construction economy measured as the development of bridge deck area unit rate (FIM/m²) and as the standard bridge price.
 - Overhead costs per district
- (e) Staff development indices

- (f) Use of equipment
 - Equipment unit rates per district
 - Use of FinnRA's own equipment and different equipment payment methods
- (g) Construction transports
 - Amounts of transported materials
 - Transport distances in each district
 - Productivity of road construction transports
- (h) Use of soil materials and aggregates
 - Efficiency of using excavated materials
 - Cost index of aggregates
- (i) Contracts
 - Percentage of contracted and force account (own labor) works
 - Number of contracts for different works and price comparison between the winner and the next ones

Of the above items, we can take the title (c), Quality of Construction, as an example of the performance evaluation process in FinnRA. The results of quality control measurements of both in-house construction and contracted works were compiled by the field and district laboratories into regular reports submitted to the HQ. The Geotechnical Division of the HQ also supervised the quality of works also through random field visits. The Geotechnical Division compiled the district quality reports into a comprehensive FinnRA report with comments on the quality achieved and the general development of quality.

ANNEX 4**CONTENT OF AN ANNUAL RESULT AGREEMENT
BETWEEN THE DIRECTOR GENERAL OF FINNRA AND
A PROVINCIAL ROAD DIRECTOR**

The annual result agreement is a booklet containing the following parts;

- (a) Description of the operating environment of the district.
- (b) Expected results based on FinnRA's general targets and possible additional local targets. For the calculation of the results, each target has its own weight in percentage points (the total weight of all targets being 100)
- (c) A Production Agreement and
- (d) A Result Budget (financial statement)

The result targets (b) are divided into the following three groups;

- Effectiveness targets, such as traffic safety, traffic conditions, costs of traffic, environment, public economy and client satisfaction.
- Financial targets, such as business economy, productivity, production economy and sales targets of chargeable operations.
- Support targets, such as staff development and improvements in the working environment.

A production agreement (c) is a document which obliges a district to produce products and services of certain quality at a certain price. The products and services include road maintenance, traffic safety and environmental operations, road planning and design works and road and bridge construction and administration. When savings are achieved in a single project or service, the district is allowed to use the surplus funds in its other activities. However, if a cost estimate is exceeded, the district has to find respective savings in its other activities.

A typical production agreement contains the following items:

- Road network development projects
- Planning and design of such projects
- Daily service level of various categories of roads (summer and winter)
- Condition of paved roads
- Condition of gravel roads
- Condition of bridges
- Ferry connections
- Administrative services and
- Local road and bridge projects, traffic safe improvements, etc.

A result budget (d) has the following items;

- Profit and loss account
- Balance sheet
- Statement of source and application of funds
- Cost estimate for chargeable outside services.

Every four months, the districts prepare an interim statement of the results. The final statement is prepared at the end of the year to cover both the financial statement and the production achievements compared to the result targets.

ANNEX 5

AUDITING OF ROUTINE MAINTENANCE QUALITY

FinnRA's maintenance quality auditing has a four-step approach:

- CLASSIFICATION OF ROADS FOR MAINTENANCE PURPOSES
- ROAD CONDITION CLASSIFICATION
- DEFINITION OF SERVICE LEVELS
- AUDITING MEASUREMENTS AND REPORTING

CLASSIFICATION OF ROADS FOR MAINTENANCE PURPOSES

There are four parameters for defining a road to be maintained, whose maintenance shall be audited:

- ROAD NETWORK
 - The network is composed of roads ranging from national highways to local roads. It has several maintenance-related parameters, such as width, surface quality, structural strength, etc.
- CLIMATIC CONDITIONS
 - The climate may be wet or dry, hot or cold. The terrain, mountainous or flat, is included this category.
- TRAFFIC
 - Traffic may be heavy or light, with lots of heavy vehicles or not, long-distance or short-range commuting traffic, etc.
- MAINTENANCE CLASS (PRIORITY CLASSIFICATION)
 - Maintenance need not to be the same for all roads, and different maintenance classes are therefore needed. Correct classification helps us to economize the maintenance operations based on the above three other parameters.

ROAD CONDITION CLASSIFICATION

To facilitate road condition classification and evaluation, FinnRA has produced illustrated booklets to define the different road condition situations. In some maintenance works, most notably in winter maintenance and the maintenance of pavements, specific measurements are needed and quantifiable data need to be collected. A visual classification is not a correct tool in such a case.

- (a) Winter maintenance

The quality of winter maintenance is defined by three measurable variables: friction, snow depth and evenness (across the road). The roads are classified based on the traffic and road class. Each road class has a winter maintenance condition target, i.e. the required level of service. The service level quality scale is defined numerically from 1 to 5 (from poor to excellent), depending on the slipperiness, snow depth and evenness. The essential element is the operation cycle time, i.e. the period during which a road has to be restored to its required quality.

Quality monitoring utilizes measurements based on random sampling along the network, to define whether the network or parts of it fulfill the quality targets (friction, snow depth and evenness). The monitoring is organized by the districts, using one or more monitoring patrols covering the roads in a random order.

(b) Maintenance of hot mix pavements

Four quality variables are measured in hot mix asphalt pavement quality monitoring: rut depth, defects in m²/100 m, bearing capacity with a falling weight deflectometer, FWD, in MN/m² and longitudinal roughness measured in IRI. The extensive use of studded tyres in Finland is causing fast rutting and wear of pavements necessitating an extensive repaving program. Due to the frequent repavings, very few other defects can be found on roads with an ADT of more than 1500 vehicles per day. The permissible rut depends on the speed limit and the class of the road. The IRI targets, from 2.6 to 5.5 mm/m, depend on the class of the road. Quality monitoring is done using FinnRA's own monitoring vehicles (see the picture in chapter 3), and the data are stored in the road condition register, KURRE, and a road databank. The same quality information is used in PMS and all of FinnRA's other systems.

(c) Maintenance of cold mix pavements and surface dressings

During the mid-1980s, FinnRA prepared illustrated booklets to define five condition classes for cold mix surface roads (and gravel roads). Currently, FinnRA measures the roughness in IRI and the defects. The frequency of roughness measurement along these roads is not as high as on the hot mix roads. The sum of defects is calculated at 2- to 3-year intervals over the whole network of the district or by random sampling. The aim is to measure 100 random 500-m sections annually.

(d) Gravel road maintenance

For gravel road quality evaluation, FinnRA also prepared illustrated booklets classifying the roads into five different condition classes (one is poor and five is good). The IRI measurement is not used on gravel roads, although it could easily be used. The inspection and rating are done in the same way as in winter road maintenance. FinnRA has classified gravel roads into two categories, depending on the traffic. Quality has two trigger limits. The lower one triggers

the ultimate need for maintenance operations. The higher one is the target quality or the accepted performance used for bonus salary calculations. For gravel roads, the surface condition is the only criterion used for quality evaluation. The quality of gravel roads is calculated as an average of all measures per year, and this index is compared to the required quality level.

(e) Traffic control devices

The quality of traffic control devices is divided into two measurement variables: road signs and road markings. These are only measured on paved roads. For both of these variables, FinnRA has published booklets describing both verbally and with illustrations the five condition classes. FinnRA will follow in road signs, traffic posts and line markings the quality requirements for reflection defined in the European Union CEN standards. Quality monitoring of these properties normally takes place in late summer and autumn.

(f) Road area tidiness

The measurement variables are landscaping (bush clearing, roadside visibility, grass cutting etc.), cleaning and shoulders (surface cleaning of dust and debris, rest areas, garbage collection and condition of shoulders) and roadside fixtures (rest area furniture, toilets etc.). There is a five-step condition scale for all the above variables supported by an illustrated booklet for each of them.

With visual classification, anyone, including the top management, can determine the quality level of a road. Using roughness, deflection, friction and other measurements, accurate data can also be stored for other management purposes.

DEFINITION OF SERVICE LEVELS

The target of the strategic planning for the condition of the whole road network is to define:

- what are the needs and requirements of traffic
- what is the target service level
- what are the requirements for road maintenance, rehabilitation, construction and traffic management
- how are the various needs targeted to the network
- how much resources are needed
- what actions are needed

The quality of the network should be in long-term balance with the traffic and financial resources of society. THE AIM IS A MINIMUM COST LEVEL FOR THE ROAD USERS AND SOCIETY (OPTIMAL NATIONAL ECONOMIC COSTS).

In principle, the roads with higher traffic densities should have a better quality than the low-traffic roads. However, the roads with long-distance heavy traffic, i.e. the National Highways, should have a higher standard than the roads used by local short-distance traffic. Another principle is that the maintenance quality should be uniform and predictable in the whole country.

AUDITING MEASUREMENTS AND REPORTING

The principle of FinnRA is to use no more than 1 % of the production cost in monitoring/auditing activities.

Only a few of the maintenance products can be measured by using the quality specifications and measurements applied to road construction. Many of the maintenance operations, such as gravel road levelling or pothole patching cannot be feasibly measured by using the same density, evenness, material quality or other specifications as are used in road and bridge construction.

One maintenance-specific quality item is the time factor, in most cases the period allowed for maintenance crews to restore the condition of a defective road.

In FinnRA, the monitoring of maintenance quality is done internally, often by the district responsible for the maintenance operations, and not by external auditors or institutions. This is appropriate because maintenance auditing and quality management are considered normal management tools.

Even though maintenance quality is the service quality experienced by the road user, there have been very few practical ways of using road user estimation in evaluating maintenance quality. One method of random sampling is to record the user complaints on FinnRA's user information telephone line.

WHAT MAKES MAINTENANCE AUDITING WORK AND BRINGS LIFE TO MAINTENANCE QUALITY AND QUALITY SPECIFICATIONS:

- SYSTEMATIC MONITORING
- SIMPLE CLASSIFICATION, WHICH IN ITSELF FUNCTIONS AS A TOOL FOR CONTROL
- SUFFICIENT INCENTIVES/PENALTIES FOR THE STAFF TO PRODUCE GOOD QUALITY, FINNRA'S BONUS SALARY SYSTEM.
- MANAGERIAL INTEREST IN READING REPORTS AND USING AUDITING INFORMATION IN MANAGERIAL DECISIONS.

ANNEX 6**QUALITY HANDBOOK**

FinnRA's first version of the Quality Handbook has the following topics.

- (a) Client Relations and Environmental Issues
- (b) Planning of Operations and Financing
- (c) Design Quality
- (d) Production Quality
 - Instructions to update and observe specifications, quality plans, control measures, use of resources, job descriptions, time schedules, etc.
 - Operational quality control, time scheduling, organization planning, contractors and sub-contractors, execution of work items on the critical path, traffic management, etc.
 - Technical quality management, quality of materials, tests, measurements and quality documents.
 - Specific requirements for maintenance quality, timeliness of actions, technical quality, work plans, upkeep of quality documents and follow-up of quality.
- (e) Quality in Administration
- (f) Quality in Supporting Activities
 - Procurement, evaluation of producers, procurement documents, quality in procured materials, goods and services, handling of materials and goods in FinnRA's stores.
 - Personnel, occupational safety, training, staff development.
 - FinnRA's documentation, preservation of documents from the quality point of view.
 - Quality of FinnRA's property, equipment, buildings, etc.
 - Research and development
 - Information service, data systems, road measurements, laboratories, mapping, printing, etc.
- (g) Operation of TQM and Quality Assurance
 - Role of the management
 - Agreement-based quality musters

- Inspections and tests
- Use of a defective product, repair, acceptance after repair or with a penalty, change of use, disqualification.
- Remedial measures
- Quality evaluations
- Quality information stores and statistical methods

This handbook will be used as a guideline for the preparation of individual quality instructions and manuals for districts and HQ divisions.

ANNEX 7

BENCHMARKING AS AN ORGANIZATION AND MANAGEMENT DEVELOPMENT METHOD IN FINNRA

At the beginning of 1994, FinnRA initiated an internal project to develop its competitiveness in the areas of:

- customer relations
- economic performance
- operative performance

The target functions were FinnRA's production activities at all levels; the whole organization, districts, areas and different products.

The methods chosen were facts, competition, information and **benchmarking** at all levels between:

- FinnRA - YIT, the largest construction firm in Finland
- FinnRA - The Swedish National Road Administration
- Districts and areas within FinnRA

The Malcom Baldrige Quality Award criterion will be used as an evaluation yardstick.

The benchmarking areas were chosen on the basis of mutual proposals and agreements:

- tendering procedures
- comparison of income statements and balance sheets (economic performance)
- performance evaluation of project management
- equipment policies

The process started with a nomination of contact persons and a workshop. Managerial participation and ownership is an essential prerequisite for a successful approach. The participants need to be familiar with the approach and the rules of the game and to trust each other to provide confidential information. It is useful to use any of the available workbooks and other benchmarking tools.

For the time being, the private sector has been interested in and ready for cooperation in benchmarking. In the case of FinnRA, it is vital to compare its efficiency and productivity on the market. This is done by comparing processes and managerial systems to the ones used by the other companies operating

successfully on the market. In fact, it would not have been essential to choose the benchmarking counterpart from the same field. The key issue is to compare the managerial processes.

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