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**TRANSPORT COST MINIMIZATION FOR
NEPAL'S SUBSIDIZED FOODGRAIN PROGRAM:
A PROPOSED MODEL**

Tilak Rawal

HMG--USAID--GTZ--IDRC--WINROCK PROJECT
STRENGTHENING INSTITUTIONAL CAPACITY IN THE
FOOD AND AGRICULTURAL SECTOR IN NEPAL

FOREWORD

This Research and Planning Paper Series is funded through the project, "Strengthening Institutional Capacity in the Food and Agricultural Sector in Nepal," a cooperative effort by the Ministry of Agriculture (MOA) of His Majesty's Government of Nepal and the Winrock International Institute for Agricultural Development. This project has been made possible by substantial financial support from the U.S. Agency for International Development (USAID), the German Agency for Technical Cooperation (GTZ), and the Canadian International Development Research Centre (IDRC).

One of the most important activities of this project is funding for problem-oriented research by young professional staff of agricultural agencies of the MOA and related institutions. In particular, funding is provided by the IDRC to support the activities of the Research and Planning Unit (RPU) of the Agricultural Projects Services Centre (APROSC). This research is carried out with the active professional assistance of the Winrock staff.

The purpose of this Research and Planning Paper Series is to make the results of the research activities of APROSC's Research and Planning Unit available to a larger audience, and to acquaint younger staff and students with advanced methods of research and statistical analysis. It is also hoped that publication of the Series will stimulate discussion among policymakers and thereby assist in the formulation of policies which are suitable to the development of Nepal's agriculture.

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Michael B. Wallace
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TRANSPORT COST MINIMIZATION FOR NEPAL'S SUBSIDIZED FOODGRAIN PROGRAM:

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Tilak Rawal*

INTRODUCTION

The production of foodgrain in Nepal has not been satisfactory in meeting the food requirements of a population growing at a rate of 2.66 percent annually. Declining crop productivity in recent years has accentuated the problem of food deficiency. Consequently Nepal, a traditional exporter of grains, relies heavily on imported food aid.

The hill areas of Nepal suffer chronic food deficits, receiving a substantial part of their foodgrain requirement from the Tarai region surplus. In the absence of well-developed private trading channels to carry out food distribution activities in the remote areas, the public sector has assumed this responsibility. The major objective has been to provide grain to people in these areas as well as food-deficit urban centers such as the Kathmandu Valley.

In Nepal, the distribution of foodgrain, mainly rice, has been an important objective of government intervention policy. Though rudimentary, public sector involvement in foodgrain distribution existed even prior to the dawn of democracy in Nepal in 1951. But public sector actions were then narrowly confined to serving the army, police and civil servants based in Kathmandu Valley. People in chronic food-deficit areas were not within the purview of public sector intervention.

The Food Management Corporation (FMC), created in 1965, is considered as the beginning of a systematic foodgrain distribution policy. The Nepal Food Corporation (NFC), created in 1974, is the sole national-level agency executing the government's food distribution program.

The government subsidy program for foodgrain transport, executed by NFC, costs His Majesty's Government (HMG) about Rs.40 million annually. This will increase in view of declining crop productivity and the resultant increase in hill area food deficits (Khadka and Gautam, 1981).

Transportation costs account for a large part of the total cost of foodgrain. In 1981, the transportation cost of a metric ton (mt) of parboiled rice was two to six times its open market price. Losses incurred by the NFC on a mt of parboiled rice distributed in the most deficit hill areas has been estimated at Rs.4537 (APROSC, 1979). In spite of transport subsidies provided by HMG, the NFC continues to incur heavy losses while executing the government's foodgrain distribution program. Decreasing available cash supplies and increasing indebtedness of the NFC are indicative of heavy losses suffered by the Corporation.

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Inefficient distribution planning and heavy bureaucratization help explain the high distribution cost. It is often said that the NFC's resources are used to meet short-term, political exigencies and the subsidized foodgrain distribution program does not benefit low-income people in food-deficit areas. This calls for a closer examination of the distribution system, focusing on the cost of transporting grain.

The broad objectives of this study are to examine in greater detail the food distribution system and suggest measures that would help minimize expenses incurred by transportation of foodgrain. Minimization of transport expenses would mean a reduced financial burden to the exchequer as well as improving the NFC's deteriorating financial position.

METHODOLOGY

The study relies heavily on secondary sources of information. Time series information were collected on foodgrain distributed by the NFC in different regions. In addition, time series data on the requirement and production of foodgrain were collected by district.

The NFC often relies on airplanes and porters for transporting grain to food-deficit areas. Lacking a comprehensive foodgrain distribution plan, foodgrain is distributed in an ad hoc fashion, with little attention given to the extent of deficiency in each region. Use of various alternative means of transport and their respective costs are examined.

To present a least-cost transportation solution, food-deficit areas were grouped under ten headings. It is hoped that the formulation of a realistic distribution plan, based on the extent of deficiency in each region, would help the NFC reconsider its procurement and storage strategy, leading to a reduction in grain transportation cost. Given the information on costs and distance between different supply and receiving points in the Tarai, attempts were made to find a cost-minimizing solution to transportation problems. A linear programming model of foodgrain transport was constructed to find ways to minimize cost.

FOODGRAIN DISTRIBUTION SYSTEM IN NEPAL

The involvement of the public sector in foodgrain distribution, specifically rice, can be traced back to 1946 when the Prime Minister, Jung Bahadur Rana, established the Department of Rice Milling and Sales to check a sudden rise in rice selling price. Over time, different institutions were created to handle foodgrain distribution, while respecting the interests of the army, police, and civil service personnel living in the Kathmandu Valley. No attention was given to the needs of people in the food-deficit hill regions. The agencies involved lacked systematic policies and programs to effectively regulate distribution (APROSC, 1982).

Steps toward the development of a systematic foodgrain distribution system were taken in 1965 with the creation of the Food Management Corporation (FMC). A famine that year and the lack of an effective agency to systematically regulate foodgrain distribution, paved the way for the creation of the FMC. Although the FMC was created to achieve balanced and stabilized distribution of foodgrain in Nepal, its activities, on the whole, were confined to stabilizing rice prices in the Kathmandu Valley. The Corporation's annual average distribution of 11,000 mt. of grains went mostly to the Kathmandu Valley, assuring a regular supply of rice at a subsidized price to the local consumers.

This situation was not at all desirable from the standpoint of the more isolated hill areas where food deficits were assuming alarming proportions. Concerted efforts were necessary to devise an organized plan to distribute foodgrain in the hills.

A serious food crisis in 1971 caused HMG to seek external food assistance. Responding generously, external donors provided Nepal with 38,400 mt. of foodgrain. However, the greater availability of grain at the central level failed to solve the distribution problem as an organized means of dispersing the grain did not exist. In an effort to rectify this situation, HMG created the Agriculture Marketing Corporation (AMC) in 1972 (Mudbhary, 1983).

The AMC was created by amalgamating the FMC and the Agriculture Supply Corporation (ASC). An institution dealing with agricultural inputs, AMC's foodgrain activities were directed toward stabilizing prices, helping increase agricultural production through provision of remunerative prices, and making foodgrain available to consumers at fair prices (APROSC, 1982).

The AMC purchased rice from channels such as the fertilizer food exchange program, rice millers, and the open market. Rice thus procured and the foodgrain received through foreign aid were distributed by the Corporation. Although still concentrating on the Kathmandu Valley, the AMC distributed an annual average of 16,000 mt. throughout the country.

Despite an improved performance over earlier efforts, the AMC, dealing with both foodgrain inputs and outputs, could not do justice to both functions. The Corporation had to divert its resources to handle a problem of serious magnitude in one sector, most often at the cost of the other sector. For example, the problem of food deficiency in the hills was so acute that the AMC's major efforts were geared in this direction while ignoring the input side.

The serious food deficit in the hills and the need for a wider diffusion of improved agricultural practices called for creating two specialized agencies to separately handle foodgrain and agricultural inputs. Realizing this, HMG separated the AMC into the Nepal Food Corporation (NFC), and the Agricultural Inputs Corporation (AIC) in 1974. Since then the NFC has executed the government-mandated foodgrain distribution program.

The NFC, under the jurisdiction of the Ministry of Food and Agriculture before 1981 and now under the Ministry of Civil Supplies, is the government's sole agent in maintaining a buffer stock, creating and

managing godown facilities, and distributing foodgrain. Headquartered in Kathmandu, the NFC has 950 staff members and offices (5 zonal, 4 main branches, 11 branches, 45 sub-branches and 4 depots) to execute activities related to food procurement and distribution.

The NFC has been buying foodgrain for distribution from the open market. The Corporation initially bought foodgrain, mainly rice, from private exporters at prices as low as 50 percent of open market prices. This system of levy procurement continued even after the Rice Exporting Companies (RECs), were created in 1974 to provide remunerative prices to producers and regulate export trade. These companies were dissolved in 1980 primarily because of declining exports and subsequent losses. During their six years of operation, the RECs combined levy sales to the NFC were 115,453 mt. of rice, 7137 mt. of maize, and 2397 mt. of wheat (APROSC, 1982).

With the dissolution of the RECs, the procurement of rice at pre-determined levy prices was not possible, requiring the NFC to rely more heavily upon open market procurement, as shown in Table 1.

Table 1. Paddy and Rice Procurement by the NFC 1975/76-1982/83 (mt)

	1975/76	76/77	77/78	78/79	79/80	80/81	81/82	82/83
Rice Levy:	33549	25743	23580	3600	-	2257	-	-
Other Procurement	706	8279	6455	20092	50148	40595	33378	43781
Paddy Levy	7942	-	-	-	-	-	-	-
Other Procurement	-	-	2763	-	-	1341	1739	527

Source: Nepal Food Corporation

Seemingly, the decline in the RECs export business and the elimination of their export monopoly in 1980 made these companies less reliable sources of levy procurement. Of a total NFC procurement of 34,255 mt. in 1975/76, levy procurement constituted 98 percent. However, this situation did not last long. Levy procurement in 1978/79 was only 15 percent of the total NFC procurement. The entire levy procurement in 1980/81 came from the private sector. Following this period, no levy was imposed on grain exported to India, while only ten percent levied on exports elsewhere. Recently, HMG introduced a production levy on rice mills (APROSC, 1982).

The NFC has been expanding its procurement activities over time. It has been buying paddy from farmers in the western Tarai districts. However, the quantity of paddy procured is so negligible that it hardly has an impact on the income of most farmers through provision of remunerative prices. Although procurement of other grains such as wheat and maize by the NFC is a welcome step, a sharp fall in paddy procurement in 1982/83 shows a lack of consistency and ability on the part of the NFC management to act as a national-level agency executing the government's food policy. However, this failure of the NFC to enter into the market on a massive scale is partly explained by a lack of adequate financial resources to procure foodgrain directly from farmers.

The NFC uses three methods for procuring grain from the open market: awarding contracts to the lowest bidder, negotiating with millers in areas with few large mills, and procuring paddy from major grain markets.

The Food Balance Sheets prepared by the Department of Food and Agriculture Marketing Services (DFAMS) provide a basis for fixation of procurement quotas by the Ministry of Supply (MOS) and NFC. Based on these procurement quotas, the NFC procures grain, relying heavily on local food-pricing committees, in the major grain trading centers in the Tarai: Bhadrapur, Biratnagar, Rajbiraj, Janakpur, Birgunj, Bhairahawa, Nepalgunj, Dhangadhi, and Mahendranagar.

Since 1980/81, the year when the RECs were dissolved, a large proportion of the NFC's procurement has consisted of rice bought from the millers and traders. Starting in February, the NFC's major procurement period extends until September. Paddy procurement by the NFC over time has remained insignificant, illustrating its poor protection of farmer's interests through the procurement, at a reasonable price, of paddy obtained directly from them.

 Table 2. Procurement of Foodgrain by the NFC (mt)

Crops	1975/76	1976/77	1977/78	1978/79	1979/80	1980/81	1981/82	1982/83
Rice	33549	34022	30035	24421	50148	42851	33378	43783
Wheat	706	1792	1895	2335	608	544	245	6267
Paddy	7942	-	2763	-	-	3141	1739	527
Maize	-	-	4266	5137	744	-	-	748
Total	42197	35814	38959	31893	51500	44736	35362	51325

Source: Nepal Food Corporation

 Time series information in Table 2 reveals that the NFC bought more grain in bad crop years--1979/80 and 1982/83--when crop production was below average. This indicates that the NFC has the ability to buy more if required, revealing that the Corporation buys only a miniscule part of the total traded grain, particularly during good crop years.

An examination of time series information on the NFC's procurement by region in Table 3 shows that the highest quantity of foodgrain is obtained in the Central Region. Despite substantial procurement in this region, a comparison of procurement and sales figures reveal a deficit situation. Another deficit area is the Western Region. This situation calls for concerted action by the NFC to procure more grain from surplus areas for such regions.

Table 3. NFC Foodgrain Procurement by Region (mt)

Regions	1976/77	77/78	78/79	79/80	80/81	81/82	82/83
Eastern Region	16974	9986	10754	29111	20131	14980	27540
Central Region	8530	9364	12429	16394	12255	6638	7766
Western Region	1553	4435	3332	1652	2375	813	3566
Mid Western Region	3983	8212	4667	3890	6094	7325	6466
Far Western Region	4762	6915	-	2454	3882	5581	5987

Source: Nepal Food Corporation

The Tarai of Nepal has been the traditional supplier of foodgrain to deficit hill regions. Grain from the Tarai moves northward into these regions while grain for the Valley moves in an east-west direction. The relatively undeveloped road network often hampers both intra and inter-regional movement of grain. Grain coming from the far-western Tarai and destined for the Valley has to be transported through India, using rail or road transport. Similarly, grain for movement northward from Kanchanpur, a district in the western Tarai, has to pass through India. There is a regular flow of grain from the Tarai into the Valley while other inter-regional movements of grain are infrequent. Restrictions can be imposed on both inter-regional and inter-district movement of grain, depending upon the food situation in a particular area. However, such restrictions most often affect movements by private individuals and not movement of grain by the NFC.

Movement of grain from procurement centers in the Tarai to deficit regions is greatly aided by the NFC's storage facilities. Currently, the NFC has storage capacity for 40,050 mt. In addition, storage facilities for 13,800 mt. are near completion, and a project for 40,000 mt. is going on in the Tarai under IDA/World Bank assistance. The present distribution of storage facilities 1000 mt. units at collection centers in the Tarai, 250-500 mt. units at relay centers, and 50-100 mt. units at distribution centers in the hills--have been of great assistance in insuring execution of the government-mandated food distribution program. In addition to these owned storage facilities, the NFC also rents storage facilities in different places as and when required (APROSC, 1979).

As stated earlier, the NFC is the public sector agency executing the government's subsidized foodgrain distribution program. In addition to the Kathmandu Valley, it is currently supplying grain to some 50 areas in the hills. The annual food balance sheets prepared by the DFAMS provide the basis for fixing distribution quotas by the NFC for each district. However, in exceptional cases such as drought and famine, additional quantities of grain are moved to a particular place.

With increasing food deficits in the hills, the NFC has no alternative but to expand its distribution network. Accordingly, almost all districts in Nepal fall within the purview of the NFC in terms of its procurement and distribution activities.

GRAIN DISTRIBUTION BY REGION

For distribution purposes, the NFC initially divided the country into three regions: Region A covering heavily-deficit remote districts--Taplejung, Panchthar, Solukhumbu, Manang, Mustang, Dolpa, Jumla, Mugu, Kalikot, Humla, Achham, and Bajhang; Region B encompassing the remaining hill and Tarai districts; and Region C consisting of the Kathmandu Valley alone. A recent reclassification by NFC has increased the number of these regions, the grading now running from A to F.

The NFC has been carrying out a subsidized foodgrain distribution program since its inception. Data available from 1976/77 onwards reveals that the NFC has been distributing increasing quantities of foodgrain, with some annual variation in quantities sold. From 1979/80 onward the NFC increased its grain sales substantially to meet foodgrain shortages that resulted mainly from crop failure.

Table 4. Foodgrain Sales by the NFC (mt)

Belts/Year	1975/76	76/77	77/78	78/79	79/80	80/81	81/82	82/83
Mountains	1673 (6.6)	2574 (9.7)	3431 (9.8)	3008 (9.4)	4502 (9.3)	6947 (15.1)	6250 (14.3)	3285 (12.0)
Hills (excluding Kathmandu)	9117 (36.1)	9832 (37.2)	11175 (32.0)	10027 (31.4)	17718 (36.4)	13964 (30.4)	11273 (25.7)	6485 (24.0)
Kathmandu Valley	14499 (57.3)	14049 (53.1)	20347 (58.2)	18888 (59.2)	26441 (54.3)	24985 (54.4)	26284 (60.0)	17333 (64.0)
Total	25239 (100)	26456 (100)	34953 (100)	31923 (100)	48661 (100)	45896 (100)	43807 (100)	27102 (100)

Note: Figures in brackets indicate percentages of total.

Mountains: 1) Taplejung, 2) Sankhuwasabha, 3) Solukhumbu, 4) Dolpa, 5) Ramechhap, 6) Sindhupalchok, 7) Manang, 8) Gorkha, 9) Mustang, 10) Myagdi, 11) Dolpa, 12) Humla, 13) Jumla, 14) Mugu, 15) Kalikot, 16) Bajura, 17) Bajhang, 18) Darchula, 19) Baitadi.

Hills: 1) Panchthar, 2) Ilam, 3) Bhojpur, 4) Terathum, 5) Dhankuta, 6) Jharkhand, 7) Khotang, 8) Sindhuli, 9) Makwanpur, 10) Dhading, 11) Nuwakot, 12) Kaski, 13) Syangja, 14) Lamjung, 15) Tanahu, 16) Parbat, 17) Baglung, 18) Arghakhanchi, 19) Gulmi, 20) Palpa, 21) Surkhet, 22) Gajarkot, 23) Dailekh, 24) Salyan, 25) Rukum, 26) Rolpa, 27) Pyuthan, 28) Achham, 29) Doti, 30) Dadeldhura.

Kathmandu Valley: 1) Kathmandu, 2) Bhaktapur, 3) Lalitpur.

Source: Nepal Food Corporation

Despite growing food deficiency in hill districts, these areas have not received enough attention in terms of subsidized foodgrain distribution. Rugged terrain and associated difficulties in moving grain from the Tarai into these areas may partly explain the inadequate NFC attention.

The region benefitting most from the program has been the Kathmandu Valley, receiving over 50 percent of the total quantities distributed. During 1976/77-1980/81, 53 percent of the total grain distributed went to Region C, while Region A and Region B accounted for five and 42 percent of the total distribution, respectively. Lack of cultivable land, political influence and concentration of bureaucrats and elites in the Valley are cited as factors influencing the level of the NFC support.

While the amount of subsidy on foodgrain distributed in remote districts is high, distribution is low. Subsidy on a mt. of parboiled rice sold in Region A in 1979/80 was Rs.4537 while in Region C it was only Rs.1352. As shown in Table 5, the NFC-distributed grain has met a very insignificant portion of total deficits in the hills.

Table 5. NFC Sales as Percentage of Deficits

Belts/Year	1975/76	76/77	77/78	78/79	79/80	80/81	81/82	82/83
Mountains	8.5	8.3	18.7	15.0	11.8	17.0	10.6	4.2
Hills	34.4	16.0	13.2	14.3	8.5	15.1	25.5	7.0
Kathmandu Valley	32.2	28.7	37.0	29.4	30.9	29.3	51.8	29.4

Source: Nepal Food Corporation

As a large proportion of foodgrain has been distributed in the Valley and adjoining districts, considerable funds have been spent to subsidize consumption of foodgrain, mainly rice, in these areas. More than 80 percent of the subsidy goes for rice--Kathmandu receiving only rice. Use of considerable government funds to subsidize foodgrain consumption in this relatively affluent area is subject to controversy and question. Probably the only justification for the continuation of the subsidy program in the Valley is the need for low-income wage earners, who also benefit from the program. However, the Valley does not deserve subsidized rice in the quantities now being received. The government's food policy is directed towards eliminating this discrepancy but considerable headway has yet to be made.

Food distribution at the district level is regulated by a district-level food management committee chaired by the district panchayat president. The members of the committee include: the Vice-President of the District Panchayat, the Member(s) of the Rastriya Panchayat representing the district, district level presidents of five class organizations, the Chief District Officer (CDO), and the District Agricultural Officer, the Chief of the local NFC office acting as the committee's member-secretary.

The dealers of the NFC throughout Nepal are the Sajha Cooperative and private dealers. In some very remote areas such as Berdim of the Rasuwa district, the NFC sells directly through its depots. In other areas, the Sajhas are encouraged to take up dealer ship. These Sajha Cooperatives have been selling subsidized grain to consumers at prices three percent above the NFC's selling prices. This margin encourages such grassroots-level institutions to get involved in grain distribution. In some areas, especially without a proper Sajha network, the district-level committee appoints private dealers and also decides on establishing NFC distribution depots at specific points, to reach larger numbers of people within a particular district.

The CDO plays an influential role in matters pertaining to food distribution. Depending on the situation, he fixes sales quotas for consumers, based in most cases on the availability of grainstocks.

In Rasuwa district, one NFC distribution depot located 24 kms. north of Dhunche, the district headquarters and five Sajha Cooperatives are involved in foodgrain distribution activities. Foodgrains, mainly parboiled coarse rice and raw coarse rice, are made available to the Sajhas by the local NFC office at prices fixed by the Corporation. The Sajhas are allowed to fix retail prices at a level three percent above the NFC selling prices. Currently, the Sajha Cooperatives are buying parboiled coarse rice from the local NFC office at Rs.4.75/kg. and selling it to consumers at Rs.4.90/kg.

The Sajhas are issued directives by the local committee not to sell more than 10 kg. of foodgrain to one person at a time. As in other districts, in Rasuwa the CDO was found to be playing an influential role in actual distribution, imposing restrictions and issuing coupons as and when required.

Despite the government's laudable objective of benefitting the poor through provision of grain at subsidized rates, it is often argued that the major beneficiaries of the program have been government officials. Poor people in remote areas do not have access to subsidized grain. A close observation of food distribution reveals that the benefits accrue to influential people, mainly government employees. While officials were issued coupons for 25 kg. of rice per person per month by the CDO office, no such arrangements existed for the local people. In terms of access to subsidized foodgrain, people living around the distribution point had an edge over those living far away. A differential quota system, and sales of larger quantities to persons from distant places, might solve some of these problems.

The Food Security Mission of 1978 recommended the establishment of a minimum operating stock (MOS) of 10,000 mt. to maintain the smooth flow of grain to deficit areas (Rawal, 1984). The idea behind the creation of such a stock was to prevent large fluctuations in prices and contribute towards price stabilization through maintenance of a constant flow of grain throughout the year. This was intended as a minimum stock upon which the NFC would not draw, except in emergencies, to execute its regular food distribution program.

Although maintenance of minimum operating stock of 10,000 mt. is an integral part of IMG's food policy, data on stock holding positions of

the NFC reveal that the Corporation has not been able to maintain this stock throughout the year. A stock of 35,600 mt. held by the NFC in August of 1983, including commercial purchases, food aid, and food loans from India, shows that given adequate funds and facilities the NFC should be able to maintain a stock of 10,000 mt.

In addition to the establishment of MOS, the Mission also recommended the creation of an emergency reserve stock (ERS) of 5,000 mt. based upon calculations that this amount ensures the minimum nutritional levels required by 200,000 people for 60 days (FAO, 1978). The creation of an ERS is to overcome the problem of food deficiency in emergencies. The creation of such a stock would have special significance in Nepal, a country prone to natural catastrophies such as floods and landslides. The geophysical position of Nepal makes it virtually impossible to bring in food from abroad for short-term relief. It is desirable, then, to maintain a stock for relief operations in the afflicted areas, allowing HMG a reasonable period of time to mobilize additional food supplies.

HMG has expressed a firm commitment to establish an ERS demonstrated by its willingness to increase it to 10,000 mt. In view of problems associated with moving foodgrain into remote areas, it would be appropriate to establish such stocks at strategic points. This would greatly facilitate timely mobilization of foodgrain to afflicted areas, and allow HMG to cope with such situations. With proper financial support from HMG, the NFC should be able to maintain and operate ERS.

PROCUREMENT AND SELLING PRICES

Prior to the RECs, the NFC received foodgrain from private traders who were issued export licenses by HMG. These traders were obliged to provide the NFC with a percentage of their total exports at a predetermined levy price. This system of NFC levy procurement continued even with the RECs. Over the years, HMG has changed the proportion of levy exports, but the levy price per 100 kg. of parboiled rice remained stable at Rs.139 during 1972-1981. However, with dwindling export business, the RECs became less reliable sources of levy procurement, forcing the NFC to buy increasing quantities of foodgrain on open markets at prices much higher than levy prices. Except wheat, which registered a 4.5 percent price decline in 1982/83 as compared to 1981/82, prices of all other crops procured by the NFC have risen over time, as Table 6 displays.

Table 6. Average Price of Foodgrains Procured by the NFC (Rs/100 kg)

Types of Grains	1980/81	1981/82	1982/83
Parboiled Coarse Rice	312	345	386
Raw Coarse Rice	309	158	391
Paddy	144	297	182
wheat	-	-	284
Parboiled Fine Rice	-	-	419
Raw Fine Rice	-	-	468
Maize	-	-	190

Source: Nepal Food Corporation

After the dissolution of the RECs, the NFC had no alternative but get involved in paddy procurement. Such intervention by a public sector agency has special significance in relatively less-developed districts of the western Tarai where competition among traders is rare, unlike the eastern Tarai. Though in limited quantities, the NFC has been procuring paddy mainly from these relatively less-developed Tarai districts in the west. With the exception of Bhairahawa--a major grain trading town some 300 kms. southwest of Kathmandu, where NFC procurement prices averaged Rs.185 per 100 kg. of paddy--the buying price in 1981/82 ranged between Rs.150 in Sati of Kailali district to Rs.165 in Nepalgunj of Banke district. Because of this situation, the NFC should expand its procurement activities in these areas to avoid unprofitable market sales by farmers. Higher paddy prices offered by the RECs in these areas are a vivid manifestation of benefits accruing to farmers as a result of public sector intervention. It is interesting that in Nepalgunj, the average price of coarse paddy just one year before the RECs were created was Rs.1.08/kg. increasing to Rs.1.60/kg. during the first year of their operation (APROSC, 1982). Thus, public sector activities, given proper support, work to benefit growers in areas where farmers are subject to exploitation by private traders.

Before the NFC moved under the jurisdiction of the Ministry of Commerce and Supplies (which recently became two separate Ministries), foodgrain distribution prices were fixed by the MOA. Since November 1981, the NFC has been entrusted with this authorization. As the major objective of the subsidized foodgrain distribution program is to provide benefits to the maximum number of people in the food-deficit regions, HMG has tried to bear the cost of the program. Prices of foodgrain--rice accounting for 87 percent--distributed under the program remained unchanged during 1975-1981, while selling prices of foodgrain varied between regions A, B, and C, depending upon the cost involved in moving grain into each region. Higher selling prices of foodgrain in Region A, covering the most severe food-deficit districts, are explained by higher transport costs.

With a significant decline in levy procurement and the consequent heavy reliance on the market for grain procurement at competitive prices by the NFC, an increase in the selling prices of foodgrain was inevitable. Additionally, the precarious financial position of the NFC, its increasing reliance on HMG for financial support, and the inappropriateness of maintaining constant selling prices in the face of rising procurement prices, facilitated an upward revision in the NFC's selling prices of foodgrain during October 1981. Meanwhile, the NFC reclassified deficit regions with the objective of systematically implementing the foodgrain distribution program.

Unlike the past when prices of subsidized foodgrain remained constant for as long as seven years, the NFC now has taken the more pragmatic approach of adjusting selling prices in accordance with procurement prices. This is necessary as the NFC has to buy increasing quantities of foodgrain on the open market and purchase commercial foodgrain from abroad to abate the problem of food deficiency. Since October 1981 and the present time, the NFC has increased the selling prices of foodgrain on at least three different occasions. Retail prices of foodgrain have remained highest in Region A, indicating the remoteness of the areas and high costs involved in moving grain.

Within Region A, which covers the chronic food-deficit districts, procurement cost constituted less than 30 percent of the cost involved in distributing foodgrain there. The rest, comprising approximately 70 percent of the total cost, was explained by other expenses, transportation constituting more than 50 percent of the total cost (Table 7). However, Region E, covering the three well-developed districts of the Valley: Kathmandu; Lalitpur; and Bhaktapur, transportation costs constituted eight percent of the total grain distribution cost during 1982/83-1983/84. During the same period, transportation costs in Region E constituted 11 percent of the procurement cost, while in Region A it averaged 176 percent (APROSC, 1982).

 Table 7. Regional Foodgrain Distribution Expenses (Rs.'000)

Description	Region A			Region B			Region C		
	1982/83	83/84	84/85	82/83	83/84	84/85	82/83	83/84	84/85
Procurement	11628	20767	17660	5940	8820	8835	16380	27415	24510
Transportation Costs, Loading Unloading Charge	19412	37745	44904	4028	7546	7508	8198	12965	13279
Other Expenses	3802	6068	6389	1943	3034	3193	5141	8415	8863
Total Expenses	34842	64580	68963	11911	19400	19536	29719	48795	46652

 Table 7 (cont). Regional Foodgrain Distribution Expenses (Rs.'000)

Description	Region D			Region E			Region F		
	1982/83	83/84	84/85	82/83	83/84	84/85	82/83	83/84	84/85
Procurement	13140	21572	19285	44730	76500	68400	87596	12645	11305
Transportation Cost, Loading Unloading Charge	2073	2050	1576	4480	9430	8046	490	1103	716
Other Expenses	4298	6625	7866	14627	23495	24730	2483	3884	3786
Total Expenses	19511	30247	28727	63837	109425	101176	10569	17632	15807

Figures for 1984/85 have been based on proposed NFC activities

Source: Nepal Food Corporation

 Although Region A might have received a higher per unit subsidy to cover the high cost of transporting grain there, in terms of regional allotment of financial resources, the major share has gone to Region A. Taking the average of two years (1982/83-1983/84), total expenses incurred in Region A constituted only 57 percent of the amount spent to execute the foodgrain distribution program in Region E. In 1979/80, NFC was incurring a loss of Rs.4537 on every mt. of rice distributed in the

Region A, followed by Rs.2205 in Region B, and Rs.1352 in Region C (APROSC, 1982).

The high level of subsidy given to Region A can be justified on the basis of low crop productivity, low purchasing power, and high transportation costs. Available data for 1982/83 reveal that the NFC losses on the foodgrain distribution program amounted to Rs.55 million (Table 8).

Table 8. Extent of Subsidy in Foodgrain Distribution, 1982/83 (Rs 000)

	Reg.A	Reg.B	Reg.C	Reg.D	Reg.E	Reg.F
Procurement Price	11628	594	16380	13140	44730	7596
Transportation Cost, Loading Unloading	19412	4028	8198	2073	4480	490
Other Expenses	3802	1943	5141	4298	14627	2483
Total Expenses	24367	11911	29719	19511	63837	10569
Total Sales Revenue	12938	6273	16330	10921	62645	5807
Loss Incurred by NFC as Subsidy	-11439	-5638	-13	-8590	-1192	-4762

Price was weighted by proportion of rice, maize and wheat that constituted 33865 mt of foodgrain distributed in 1982/83.

Source: Nepal Food Corporation

A major portion (38 percent) of this was spent on subsidizing foodgrain distribution in Region A. Although a large part of total grain distributed under the program went to Region E, low transportation cost required in moving grain there substantially reduced the NFC's losses.

The NFC expenses--in particular operational expenses--have risen substantially. These expenses are illustrated in Table 9.

Table 9. Breakdown of NFC's Operation Expenses (Rs.'00)

Descriptions	1983/84			1984/85		
	Foodgrain (mt)	Oil (lt)	Sheep, Goats (No.)	Foodgrain (mt)	Oil (lt)	Sheep, Goats (No.)
Procurements Costs	170013 (4250.00)	4641 (15.47)	3710 (337.27)	152000 (3800.00)	11250 (18.75)	3460 (314.54)
Transportation Costs, Loading Unloading	71242 (1781.00)	551 (1.84)	575 (52.27)	76367 (1909.17)	1200 (2.00)	350 (31.81)
Town Panchayat Tax	850 (21.25)	23 (0.08)	-	760 (19.00)	56 (0.09)	-
Godown Rent	600 (15.00)	50 (0.17)	-	480 (12.00)	100 (0.16)	-
Sales Commission	4735 (118.37)	149 (0.50)	-	945 (23.62)	240 (0.40)	-
Bank Interest	17733 (443.32)	523 (1.74)	64 (5.81)	28195 (704.87)	1119 (1.86)	60 (5.45)
Losses	3453 (88.55)	87 (0.29)	124 (11.27)	1175 (29.37)	187 (0.31)	100
Administration Cost	22500 (562.50)	-	-	20000 (500.00)	-	315 (28.63)
Miscellaneous	2250 (56.25)	552 (1.84)	-	3400 (85.00)	1033 (1.72)	200 (18.18)
Total	293465 (7336.24)	6576 (21.92)	4473 (406.62)	283322 (7083.05)	15185 (25.30)	4485 (407.72)

Note: Figures in brackets indicate per-unit costs.

Source: Nepal Food Corporation

Profits from sales of non-foodgrain items like cooking oil, Tibetan goats and sheep have not been able to make up the losses incurred on foodgrain sales. This is partly explained by declining sales. Compared to 1982/83, losses incurred by the NFC on foodgrain distribution have declined in 1983/84. Factors contributing to this may include upward revision of selling prices of foodgrain in July 1983.

The NFC could improve its financial position by reducing operation expenses. Administrative costs per mt. of foodgrain distributed in 1983/84 was Rs.562 and losses were as high as Rs.88 per mt. Efficient NFC management could curtail these expenses. The NFC has begun thinking along these lines as it proposes to cut administrative expenses on every mt. of foodgrain by Rs.62 in 1984/85 (APROSC, 1982).

A drastic cut in various peripheral NFC expenses is imperative--especially in light of the inadequate subsidy received from HMG. The subsidy given to the NFC does not cover its loss incurred by the government-mandated distribution operations. The large part of the loss which is not made up by profits from the NFC's non-foodgrain operations is funded out of equity capital and through loans which are mostly excused due to the NFC's inability to repay them.

HMG has been providing a substantial transport subsidy to the NFC. In 1981/82, transport subsidy to the NFC amounted to Rs.44 million. The transport subsidy aims at maintaining price stability and cushioning the food deficit in hill areas. In addition, HMG has also been providing financial support for interest payments, construction of storage facilities, and increased equity participation. However, it is becoming increasingly difficult for the exchequer to provide a substantial subsidy to the NFC. Thus, the subsidy was cut from Rs.80 million in 1982/83 to Rs.32 million in 1983/84 (APROSC, 1982).

The increasing food deficit in the hills and subsidy expenses warrant immediate action to operate the food distribution program in a cost-effective manner. This can be achieved through reduction in grain transportation cost, which composes a large portion of the total distribution cost.

TRANSPORTATION OF FOODGRAIN

The major grain supply points are located in the Nepalese Tarai. Grain from these centers is usually moved into the hills during dry weather. Grain destined for remote areas is transported by truck to the relay centers awaiting further movement by porters and animals. Extensive use is made of air transport to insure timely availability of grain in remote areas, especially during emergencies. Since grain movement from relay centers is mostly by sheep, mules, and porters, large sacks of grain at the relay center--godowns--are broken into small quantities. Transport from the relay centers is handled by private contractors selected on the basis of competitive bidding for different routes. Normally, a porter carries as much as 50 kg. while sheep and mules can carry 15 and 80 kg. respectively in two-bag packs (APROSC, 1982).

Data available from the Department of Roads reveal that the road network at present consists of 5335 km, whereas in 1950 it was insignificant. In spite of this achievement, the absence of motorable roads has greatly hindered timely movement of grain into deficit regions. Even in the Tarai, grain from Mahendranagar, Dhangadhi, and Nepalgunj destined for the Kathmandu Valley has to pass through India.

Due to the limited road network, animals and porters are widely used to transport grain to the remote areas during the dry period. Lack of bridges across the fast-flowing rivers and the probability of landslides during the rainy season make tracks in the hills impassable. Under these circumstances, air transport is frequently used to supply grain to the deficit areas--particularly within the Mid-Western and Far-Western Regions. The type of aircraft (supplied by UNDP and RNAC) for NFC charters can carry 1.3-1.5 mt. a trip. Air lifting of foodgrain should be discouraged, however, because of high costs.

Despite the absence of an extensive road network in Nepal, road transport is the most important mode. Almost all initial movement of grain from the major collection centers in the Tarai to the relay and sales centers is by trucks hired from the private sector every year through tender. Since road transport is the cheapest mode, followed by animal, porter and air freight, it would be in the best interest of the NFC to rely increasingly on overland transport. The completion of the western section of the east-west highway and many other proposed and ongoing north-south road projects should greatly facilitate transportation of grain by the NFC in a cost-effective manner.

The major beneficiary of the subsidized food distribution program, the Kathmandu Valley, receives grain from different points in the Tarai entirely by trucks. However, loads carried by heavier trucks have to be transferred to smaller vehicles at Hetauda due to weight restrictions on the hilly road reaching Kathmandu. The ropeway running from Hetauda to Kathmandu, with a load capacity of 545 kg. per carrier, is the most cost-effective mode of moving grain into the Valley. Compared to land transport, the ropeway can save Rs.77 per mt. However, due to insecurity of goods in transit and the irregularity of services, the NFC finds it an undependable means of moving grain into the Valley (FAO, 1984). Movement of grain to other deficit areas such as Syangja, Pokhara, and Dhankuta is by road.

Despite the savings on transportation cost that could result from increased reliance on overland transport to some areas, the NFC has few opportunities to reduce cost on many routes. Given the present state of road development, the NFC has to rely entirely on porters and animals for movement of grain from the relay centers to the final sales or distribution points in some highly-inaccessible regions. Air dropping of food would be the only alternative in such areas. However, except during emergencies, this is not desirable due to costs and losses in grain.

With HMG's commitment to provide foodgrain to people in the deficit regions that are not accessible by modern means of transport, there is hardly any potential for the NFC to maneuver transportation cost. However, certain savings on distribution cost can result from a properly-planned distribution mechanism. Although foodgrain quota allocated for each district are based on the extent of food deficiency and information on the food balance situation provided by DFAMS, the actual distribution fails to reflect these.

Additional foodgrain is moved into some districts where initial delivery, which is based on food situation information in that particular district, is found insufficient. Allocation of additional quota, however, depends very much on the ability of politicians and the district administration to influence the decision-making authorities at the center. A realistic distribution plan, based on the extent of deficiency and demand for foodgrain in each region, and reconsideration of current procurement and storage strategies may help reduce transport costs. Instead of a situational approach towards curtailing transport expenses through the use of the most cost-effective mode, a holistic approach that calls for reshaping the NFC's distribution, procurement and storage strategies would be more effective. Emphasis on procurement of grains in areas adjoining deficit regions could help minimize

transport expenses. The development of a realistic distribution model, then, would facilitate reconsideration of the NFC's present storage and procurement strategies.

THE PROPOSED DISTRIBUTION MODEL

Based on the proximity of deficit regions to the supply points in the Tarai, the country is divided into ten new regions. The division has been made so each supply point in the Tarai supplies grain to at least three hill districts. A three years' moving average has been calculated to present a realistic picture of foodgrain requirements and availability in each region. The proposed regions in the western Tarai reveal a deficit situation while regions in the eastern Tarai reveal a surplus for each region.

Table 10. Food Balance Situation by Proposed Regions (mt./Rice)

Regions	Availability	Requirement	Balance
A. Bhadrapur	97,053	69,607	+17,446
B. Biratnagar	150,263	108,270	+41,992
C. Rajbiraj	122,029	91,807	+30,222
D. Janakpur	128,359	135,433	- 7074
E. Hetauda	273,274	252,391	+20,882
F. Bhairahawa	217,188	205,557	+14,632
G. Dangdeukhuri	36,371	51,142	-14,771
H. Nepalgunj	69,974	78,290	- 8316
I. Dhangadhi	49,442	51,330	- 1887
J. Kanchanpur	27,885	29,066	- 1182

Source: DFAMS

In view of this deficiency on the western front, the proposed model aims at ensuring the supply of foodgrain from the surplus areas to the deficit areas, incurring minimum transportation costs. To arrive at an optimum-cost solution, the cost involved in moving a mt. of foodgrain between different supply points in the Tarai has been taken into account. Although hill areas do not fall within the purview of the proposed model, the model should also ensure availability of grain even in these areas as food availability in each region is calculated by taking into account the food situation in each deficit district.

As shown in Table 11, Jhapa, Morang, Saptari, and Hetauda possess considerable surplus grain. However, due to high transportation costs, surplus grain in Jhapa and Morang districts needs to be stored locally for export at better prices to other countries. Saptari and Hetauda have surplus to be exported to Dhanusha and Dang, respectively. Dang needs to import foodgrain both from Bhairahawa and Hetauda. The optimal cost is Rs.5,023,025. This greatly reduces the expenses incurred by the NFC and helps the Corporation devise an integrated procurement, storage, and distribution plan.

Table 11. Optimum Cost Solution (00 mt).

Regions	1	2	3	4	5	6	7	8	9	10	Surplus	Total
1.Jhapa	696										175	871
2.Morang		1083									420	1503
3.Saptari			918	71							231	1220
4.Dhanusha				1284								1284
5.Hetauda					2524		115				94	2733
6.Bhairawa						2026	146					2172
7.Dang							250	114				364
8.Nepangunj								669	31			700
9.Dhangadhi									483	12		494
10.Mahendranagar										279		279
Total	696	1083	918	1354	2524	2026	511	783	513	291	919	
Requirement												

Optimal Cost: Rs.5023025

CONCLUSIONS AND RECOMMENDATIONS

The model just presented provides policymakers with a basis to adopt realistic strategies pertaining to procurement and maintenance of regional grain stocks and their dispersion. Given the lack of a road network between food-deficit hill areas and the food-surplus Tarai, the NFC is left with very limited opportunities to influence transportation costs. However, some reduction in moving costs can be achieved by reshaping the government's procurement, distribution, export, and storage strategies.

The NFC can curtail transportation expenses by using the cheapest sources of grain. The Kathmandu Valley is one area that receives grain from several areas, including Nepalgunj, Bhairahawa, Bhadrapur, and Birgunj. A savings of Rs.234/mt. could result if the grains to Kathmandu came from Birgunj instead of Bhadrapur. For grain to be distributed in the Valley and adjoining hill districts, it is important that serious attempts be made to procure grain in the surplus Tarai districts: Parsa, Bara, Rautahat, and Chitwan. Ironically, the NFC has been concentrating more on procuring grain in the eastern and western parts of the Tarai while little effort is put into procuring grain in the areas mentioned above. A mere reduction in the current level of subsidized grain distribution in the Valley would also help.

The NFC needs to reconsider its procurement strategy and emphasize procurement of grain even in deficit areas where grain is sold at depressed prices during the harvest period. Procurement of grain at reasonable prices and storage for distribution during the lean period would be beneficial to the NFC, producers, and consumers. Unlike the NFC, private traders have been incurring substantially lower transport costs by using the cheapest source of grain. For example, private traders bring into the Valley a substantial quantity of rice from Nuwakot, a surplus hill district 50 km. northwest of Kathmandu, immediately after paddy harvest. As a result, the NFC has to move considerable quantities of grain into the area for distribution during

the lean period. The efforts to procure grain and store it locally for distribution would save money on cross-transportation of grain.

To begin, the NFC should, on an experimental basis, initiate procurement programs in deficit hill areas where agricultural development projects are implemented and increase in yield is expected. Such a procurement plan could be backed up by a differential pricing policy reflecting the cost of moving grain to different places. This variable pricing policy would call for fixing higher crop prices in deficit remote regions, compared to surplus areas in the Tarai. This policy may also partly do away with the dampening effect that subsidized foodgrain distribution has on incentives to produce more locally. The primary goal should be to achieve a balance between procurement and distribution in each region. This would help curtail transportation expenses through a reduction in inter-regional movement of grain.

HMG/N's recent decision, as stated in the budget speech of fiscal year 1984/85, directing the NFC to initiate procurement activities in the hill areas at incentive prices, should be instrumental in providing incentives for local grain production, ultimately helping achieve a balance between regional procurement and distribution. However, for this idea to materialize, the NFC needs to be adequately backed by means and facilities. Without a concerted effort to strengthen the NFC, executing procurement activities effectively in the hills may remain merely wishful thinking. It has to be remembered that more important than the structure and type of organization involved are the drive and energy with which such policies are executed. Proper implementation of the proposed procurement program and greater reliance on porters and animals for movement beyond the relay centers would save a substantial amount of money expended on grain transportation.

REFERENCES

- APROSC (1979), Nepal: Grain Storage Project, October, Kathmandu, Nepal.
- (1982), Primary Market Procurement Project, Kathmandu, Nepal.
- Food and Agriculture Organization (1978), "Report of the Food Security Mission-Draft," Rome: FAO.
- Khadka, B.D., and J. C. Gautam (1981), "Demand and Production of Food Grains in the Hills," in Nepal's Experience in Hill Agricultural Development, Ministry of Food and Agriculture, His Majesty's Government, Nepal, pp. 29-42, Kathmandu, Nepal.
- Mudbhary, Purushottam K. (1983), "Impact of Rice Pricing Policy in Production, Consumption, and Trade in Nepal," May, Kathmandu, Nepal.
- Nepal Food Corporation, unpublished data, Kathmandu, Nepal.
- Rawai, Tilak (1984), "Public Policy in Relation to Procurement and Distribution of Food Grains," in Food Policy Issues in Nepal, APROSC and the International Development Research Centre, pp. 161-185, Kathmandu.

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