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ECONOMIC SURVEY OF THE FALKLAND ISLANDS

Chairman: The Rt. Hon. Lord Shackleton KG PC OBE

VOLUME 1 of 2

RESOURCES AND DEVELOPMENT POTENTIAL

JULY 1976

Presented to the Secretary of State for Foreign and Commonwealth Affairs

Price £8.00 net.

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Prepared by The Economist Intelligence Unit Ltd

Copies of this publication may be purchased only from the
Government Bookshop, 49 High Holborn, London WC1. Price £8.00.

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FOREWORD

To guide the reader through what is a lengthy report, the following remarks may be of assistance.

Volume One contains an introduction by the Chairman and under various chapter headings:

a. an analysis of the overall economy of the Falkland Islands;
b. description of the resources of the Islands and their surrounding waters;
c. an assessment of their development potential, pointing out opportunities, constraints and the impact of any development.

Volume Two begins by summarising the findings of Volume One, then goes on to discuss and propose a development strategy, and finally presents recommendations for a policy and programme of economic development, together with the financial implications and implementation arrangements which we judge to be necessary for them to be carried out.

FALKLAND ISLANDS SURVEY - VOLUME ONE

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TERMS OF REFERENCE

In the light of the weakening of the colony's economy and the decline in population, and taking into consideration previous reports including those of Theophilus, Armstrong, Comben/Waller and Davies:-

1. To examine the resources of the colony and the dependencies and the prospects for economic development with particular reference to agriculture, the wool industry, the need for diversification and possible developments in oil, minerals, fisheries, and alginates and to make recommendations.

2. In this context to examine the present fiscal structure and the provision of government services in the colony and dependencies in the light of the present uncertain economic climate and to make recommendations. To advise on priorities for capital expenditure over the next five years with particular reference to the need for improved infrastructure and to programmes for public utility development and housing.

3. To assess the financial, manpower and social obligations of any recommended economic strategy, with particular reference to the encouragement of small scale enterprise and scope for local investment, and the extent to which all these needs can be met from local resources and to the degree which recourse to all potential external resources may be necessary.

INTRODUCTION BY LORD SHACKLETON

I would like in this introduction to draw attention to certain of the issues that confronted us in our Economic Survey of the Falkland Islands and to identify the major considerations and constraints which we have had to bear in mind in arriving at a strategy for the future economic development of a group of islands half the size of Wales, with a population of less than two thousand, about 7,500 miles away from the United Kingdom. It is also right, at the outset, to dispel any reputation of the Falkland Islands, dating back to Dr Johnson, as 'bleak' or 'barren'. Bleak they may be to some people, but they possess a charm for those who enjoy the wide vistas of sea and landscape, typical of Shetland or the Outer Hebrides, windy hills and sunshine, a fascinating wild life, and a friendly, hardworking and hospitable people.

Almost from the day that my fellow team members and I embarked upon our task, we have been made very aware of the degree of interest on the part of many people who are concerned for the future of the Islands. Indeed, we have received much valuable advice. It quickly became apparent to us that we were very far from being the first survey to study the Falklands. Over the last fifty years there have been many studies and reports (see Bibliography at the end of the Report) which have included agriculture, fisheries, fiscal policy, the Government service and education - to name but a few. I am reminded of a definition from a member of our team with experience of the Highlands and Islands of Scotland of an island as "a piece of land entirely surrounded by advice". However, most reports contained good advice, although many of the recommendations have never been implemented.

This Survey differs in a number of respects from its predecessors. First, it was intended to provide an overall, indeed synoptic, examination of the Falklands' economic prospects in all sectors, and the recommendations (Chapter 19) are presented with a plan of action for their implementation, as well as a broad estimate of their financial implications. The Terms of Reference of the Survey were therefore very wide. It was right that they should have been so. In any assessment of the development prospects of the

Falkland Islands, a comprehensive approach is necessary, not only to ensure that possibilities are not overlooked, but in order to achieve a balanced development strategy.

Secondly, we soon realised that to assess properly the development potential of the Islands it would be essential to take into account the social influences. A decision was therefore taken to interpret our Terms of Reference in the widest possible sense and, in effect, to make it a socio-economic survey. Indeed, we found the social dimension crucial to our work. We were conscious, too, that in interpreting these various social factors, we inevitably had to make judgements of a kind which could not be supported by firm statistical evidence. We are well aware that we have touched on sensitive issues and have reached conclusions, some of which may be unexpected, but whose significance we were all agreed was fundamental to any future strategy for the Falkland Islands.

A major aspect of our Survey which must be clearly recognised is that the Report has been prepared by a team wholly independent of Government, and while obviously we have sought advice from all quarters, our recommendations are entirely our own. Furthermore, the Terms of Reference excluded any matters relating to the political future of the Falkland Islands and their Dependencies, and the Survey had to be conducted on the assumption that their political status would remain the same as during the past one and a half centuries. Nonetheless, the hopeful development in international affairs which has led to regional cooperation between different nations is as relevant to this part of the world as to other areas where economic cooperation has been achieved. It is logical therefore that in any major new developments of the Islands' economy, especially those relating to the exploitation of offshore resources, cooperation with Argentina - even participation - should, if possible, be secured. The sovereignty issue overhangs our Report, as it does the Falklands, and the absence of a settlement could well inhibit the full development of the Islands. This does not, of course, diminish the fact apparent to any visitor to the Islands that the population is British and, as was forcefully impressed upon us whenever the subject was discussed, is firm in its desire to remain British.

There was one further consideration which we bore in mind at all times when we were studying the various possibilities for economic development. This was the need to have due regard to conserving the natural environment of the Falkland Islands and the Dependencies, with their surrounding waters.

I would now like to point briefly to one or two important conclusions that emerged from our Survey. The Falkland Islands' economy has suffered historically from a lack of local investment and a continual flow of private funds out of the Islands to the United Kingdom. The transfer of company funds alone over the last twenty years has amounted to over £5 million in current prices. A result of this has been that the UK Exchequer has substantially benefited from tax, on both the profits and private dividends remitted to the UK.

It is against this economic background, as well as the evaluation of the resource potential of the Islands, that we have put forward recommendations for a development programme which will call for certain UK expenditure, capital and recurrent, over the next five years (see Chapter 20). The major item is the extension of the runway of the new airfield, without which any substantial new development would, in our judgement, be greatly handicapped.

I have commented earlier on the lack of implementation of the recommendations of previous reports. It is our view that a main reason for this was the absence of the appropriate sort of government machinery. We are of the opinion that no major long-term economic development can take place without the provision of the right kind of institution within the government machine. In saying this, we do not wish to reflect on the existing administration of the Falklands. The Secretariat and other government departments have struggled manfully in providing an astonishingly wide and diverse range of services - in fact most services which would normally be the responsibility of central and local government - and it is a tribute to their officers that they have done so. I should note that, in considering our proposals for the strengthening of the government machine, we have had regard to developments in local government machinery in the United Kingdom and have received advice from local authority experts.

Our recommendations also have some constitutional implications. While the constitution was not directly within the Terms of Reference of this Survey, the changes in government organisation which we regard as vital to the implementation of our recommendations do involve constitutional change. Our principal recommendation is the establishment of the post of Chief Executive, who would be directly responsible to the Governor in Council: a post which would replace the present office of Chief Secretary. We have also recommended that the Governor, who is appointed by the Foreign and Commonwealth Office and who, in our opinion, carries a heavy and lonely burden of responsibility, should be assisted by a Political Adviser: a post to be filled by a Diplomatic Service officer who could deputise for the Governor in his absence.

But it is the post of Chief Executive which we regard as crucial to the implementation of our proposals. While he would be responsible for many of the existing policy functions of the Chief Secretary, he would be charged with the major responsibility for development across the whole spectrum of economic and social activity. He would need to be able to relate his responsibilities as the senior government servant, under the Governor, with the priorities associated with the development programme.

It is necessary to emphasise the difference between the role of Chief Executive and that of the Political Adviser. Whereas most diplomatic career posts are for limited tours of duty (of the order of two or three years), we are concerned that the Chief Executive should be appointed for a longer period. Ideally, he should be a man of wide administrative experience, for example in local government or industry who, when appointed, should have sufficient authority and status to implement a development programme, and to function particularly in the field of business and economic negotiation in a role not dissimilar to that of a present day local authority Chief Executive, for instance in Shetland.

While we believe that the Government, through the appointment of a Chief Executive - suitably supported - has a major part to play, it must be recognised that much of the impetus for the implementation of our recommendations will have to come from the people of the Falkland Islands. There must therefore be determined efforts to secure their participation

and involvement through changes in the economic and social structure of the Islands. Success will in the last resort depend upon the response and commitment both of individual Islanders, and of the companies operating in the Falklands. There must be some correction of the failure to reinvest in the Islands by companies (referred to in the Report), a phenomenon which is not recent and can only to some extent be attributed to political uncertainties.

I must comment briefly on our method of working. We soon became very conscious that to produce a comprehensive report - in effect a national study - on the basis of just over four months' work was clearly very ambitious, all the more so since six weeks of that time was spent in the field or at sea. Furthermore, I was required, along with our Fisheries expert, to visit the dramatically beautiful Dependency of South Georgia which involved a further week at sea. While we were on the Islands each one of the settlements and farms (see map opposite Page 2 of the Report) was visited by one, and in most cases several, members of the team, nearly all by Beaver aircraft. I was myself able to land and spend some time at over thirty of the thirty-six farms. Between us we certainly met the majority of the population, either individually or in small groups, and gathered an enormous amount of information.

In the processing and presentation of the wide range of subjects covered, time has not always allowed a consistency of style to be achieved in the Report. We took a decision to give a comprehensive account of the resources and activities of the Islands, and opinions relevant to them, so that the reader would be properly informed as to the basis of our recommendations. Also, we felt it important that there should be reference material, particularly in those areas where we have judged it necessary to recommend that further work be carried out.

In putting forward our recommendations we may have done less than justice to the work and achievements of many people, especially previous Governors. Nor, filled as we all were with a sense of urgency on behalf of the Falkland Islands, have we acknowledged the extent to which many of our recommendations were the fruit of earlier studies. We are very grateful to a large number of people who have contributed to our work.

Our thanks go first of all to the Falkland Islanders themselves - managers, officials, shepherds, handymen - the people of Stanley and the people of the farms - for their kindness and their willingness to help in every way. I must also stress the total cooperation we received from the Governor and the Councillors, and too, the Secretariat on whom we made heavy demands. I would thank the Falkland Islands Company, from whom we also received the fullest cooperation. If we have criticisms of any of these bodies, such criticisms should not be considered in isolation from their record of achievement.

We feel a special gratitude to the Royal Navy, to the Captain and Ship's Company of HMS Endurance who were responsible for much of our somewhat complicated sea-transport arrangements including the visit to South Georgia, and especially to the helicopter crews. We are similarly very grateful to the Captain and Ship's Company of the Royal Fleet Auxiliary Tidesurge. Mention should be made of the Islands' marvellous air service, whose two pilots flew us almost daily in fair weather or foul, and our thanks go also to the British Antarctic Survey and the Falkland Islands Committee.

I would like to thank those in the Foreign and Commonwealth Office and other government and local government bodies who helped with our arrangements, and express particular gratitude to the Highlands and Islands Development Board for their willingness to second their Social Research and Development Officer to our mission, thus rounding off in a crucial area the composition of our team.

There are so many other bodies and individuals to whom one would wish to make acknowledgements, that the list would be endless. In conclusion I must, however, express my own thanks to all the members of my team, an immensely hard-working and, I believe, very happy group of people.

Shackleton

GLOSSARY

Throughout both volumes of the report, frequent use is made of terms which are either abbreviations, or are colloquial. Though these are usually described in full on their first appearance, it may assist the reader to be able to refer to the following glossary.

FIG	-	Falkland Islands Government
FIC	-	Falkland Islands Company
Camp	-	This is normally used to describe all those areas of the Falkland Islands outside Stanley, including the settlements. It is also used in an agricultural sense to refer to different grassland areas e.g. 'soft camp', 'hard camp' etc.
FIGAS	-	Falkland Islands Government Air Service.
YPF	-	Yacimientos Petroliferos Fiscales, the Argentinian State Oil Company.
BAS	-	British Antarctic Survey.
NERC	-	Natural Environmental Research Council.
OSAS	-	Overseas Services Aid Scheme.
GTU	-	Grassland Trials Unit.
Legco	-	Legislative Council
Exco	-	Executive Council

CHAPTER 1 - GEOGRAPHICAL AND HISTORICAL BACKGROUND

INTRODUCTION

The Falkland Islands and their Dependencies, lie in the South Atlantic Ocean (Figure 3). There are strong contrasts, both geographically and historically, between the Falkland Islands on the one hand and the Dependencies on the other. The Falkland Islands rise to more than 2300 ft, they have a cool temperate climate, they have been continually settled since 1833 and have sustained a financially self-sufficient, pastoral economy. Economic activity has been entirely land-based and is fundamentally dependent on sheep. South Georgia is filled with glaciers, has a sub-polar climate and cannot sustain any sort of agricultural economy. It was inhabited by transient workers related to the whaling industry from 1903 to 1965, but has never been settled in the conventional sense. The South Sandwich Islands are a string of mountainous, volcanic islands, covered by glaciers which are, for practical purposes, uninhabitable.

There is currently no economic activity in the Dependencies but for 60 years South Georgia's economy was entirely based on the sea.

FALKLANDS ISLANDS - GEOGRAPHY

The Falkland Islands lie between latitudes 51° and 53° south and longitudes 57° and 62° west about 300 miles east of the South American mainland. The colony comprises two large islands and some 200 smaller islands with a total land area of approximately 4,700 square miles. Figure 1 shows the Falkland Islands and its settlements and Figure 2 illustrates the land area in relation to Wales and the Shetland Islands.

The climate of the Falkland Islands is characterised by a narrow temperature range (49°F (9°C) in January to 36° (2°C) in July), strong winds (four gales per month, mean annual windspeed 16 mph), a fairly low rainfall evenly distributed through the year (25 inches a year, comparable with that of East Anglia) and frequent cloud cover (about 35 per cent of the total possible sunshine is recorded annually). The highest and lowest temperatures recorded are 76° and 18°F respectively; snow has been recorded in every month of the year, but seldom lies for long.

The Falkland Islands are composed almost entirely of palaeozoic and mesozoic sedimentary rocks, some of which have strong lithological and paleontological affinities with rocks of South Africa, Uruguay and Southern Brazil. There is no stragraphical connection between the Falkland Islands and the nearer parts of the South American mainland. The highest hills on East and West Falkland are 2,342 feet and 2,297 feet respectively, but general summit levels are between 1,500 and 2,000 feet. Rivers are small and the numerous intricate inlets, many of which form good potential harbours, are the result of a submergence of the land by about 150 feet since glacial times.

Much of the uplands are comparatively bare of vegetation, comprising eroded peat, scree and stone runs. At lower levels the top soil is generally peaty and acid because of the absence of limestone. Tree growth is climatically inhibited (although there are instances of successful planting of pines, mainly at Hill Cove) and the natural vegetation is grassland with certain species of heath and dwarf shrubs, which form plant communities similar to the mainland vegetation of upland Britain.

FALKLAND ISLANDS

FIGURE 1

SETTLEMENT POPULATION

- LARGE: 35plus
- MEDIUM: 16 to 35
- SMALL: 15 or less

SOUTH ATLANTIC OCEAN

WEST FALKLAND

EAST FALKLAND

LAFONIA

Land over 2000 feet
" 1500-2000 "
" 1000-1500 "
" 500-1000 "
" below 500 "
Heights in feet

Scale 1: 643,000

Miles 5 0 5 10 15 20 Miles

Roads
Tracks
Telephone Lines
Lighthouse, Beacon

ALL TERRITORIAL WATERS ARE SEAL RESERVES

Longitude 60°30' West of Greenwich

Published by Directorate of Overseas Surveys D.O.S. 906
First Edition

Agents for the sale of this map are:- Edward Stanford Ltd., 12/14, Long Acre, London, W.C.2. Price Code 4
Copies can also be obtained from Colonial Secretary's Office, Stanley, Falkland Islands.

Compiled and drawn by Directorate of Overseas Surveys.

Figure 2

Comparative Sizes:

Wales and Shetland
shown at the same scale
as the Falkland Islands

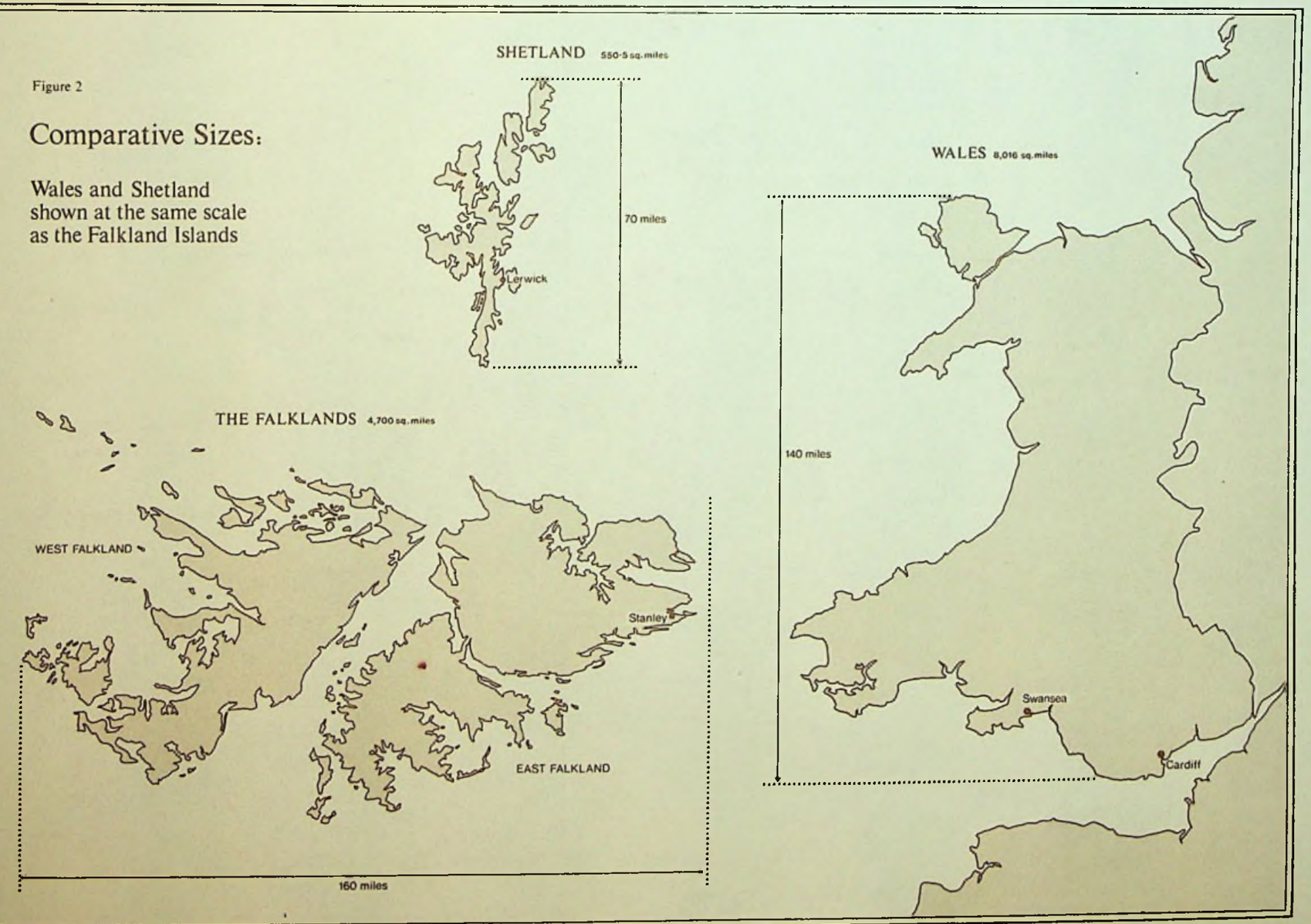


FIGURE 3 **THE FALKLAND ISLANDS IN THE SOUTH ATLANTIC**

Base map from 'The World Atlas' by courtesy of John Bartholomew & Son Ltd. Edinburgh

The wildlife of the Islands is characterised by geese, penguins, sea birds and seals. There are no native land mammals but the bird and marine mammal life is diverse and relatively unspoiled.

FALKLAND ISLANDS - HISTORY

The Falkland Islands were probably first sighted by Captain John Davis of Bristol in August 1592 and again by Sir Richard Hawkins in 1594 but the first reliable sighting was by a Dutchman, Sebald de Weert, in January 1600. The first recorded landing was by Captain John Strong in January 1690 who named the Sound between the two main islands "Fawkland Sound". The name was soon associated with the island group as a whole.

The first settlement was made by De Bougainville in 1764 and from 1764 to 1832 sovereignty over the islands was contested between France, Spain, and the United Kingdom but none of the resulting settlements persisted for more than a few years. The present Argentine claim to the Falkland Islands derives from inheritance of the Spanish claim.

Continual British settlement of the Falkland Islands dates from January 1833. Moody, the first Governor, laid out a township at Port Louis but in 1843 he removed to Stanley, the present capital.

At the beginning life was difficult for the colonists but further settlers and fresh capital were gradually attracted by the possibilities of the new Colony, principally for cattle rearing and for its potential as a port. In 1846, that part of East Falkland lying south of the isthmus at Darwin was sold to Samuel Lafone of Montevideo. Lafone, however, did not long continue to farm the property on his own account and in 1851 transferred it to the Falkland Islands Company, which was incorporated by Royal Charter in the same year. The rest of East Falkland was gradually taken up and most of it was sold by 1860. Colonisation of West Falkland began in 1867 and within two years, virtually the whole of the land had been sold. The Falklands are unique among the colonies in that the freehold title to all the land, save a few thousand acres, was sold without any proper survey. The land thus acquired was converted into large farms for sheep which replaced cattle. The Colony became financially self-supporting in the 1880's.

In the early development of the Colony, great emphasis was laid upon its strategic position, both as a naval base and as a port of call for ships rounding Cape Horn. By the late nineteenth century, Stanley had become an important bunkering and revictualling port with a primitive ship-repairing industry. These activities dwindled with the replacement of sailing ships by steam ships and finally died when the opening of the Panama Canal diverted shipping from the Cape Horn route. Sealing, mainly for oil-producing species, was carried out sporadically after the wholesale destruction of the valuable Southern fur seal in the early years of the nineteenth century.

Whaling was carried out for a few years before the First World War when a shore factory was built on New Island, West Falkland, but this was always subsidiary to the greater activity at South Georgia.

The capital of the Colony remained at Stanley and today about 1,050 people, over half the total population, live there. The other settlements are all sheep stations, their sizes varying with that of the farms. The largest is Goose Green (about 140 people). All are isolated and poorly serviced by land communication in the form of rough tracks, negotiable by landrover type vehicles and motor cycles. Most heavy supplies and the wool clip are transported by sea. Passengers, light goods and mail are carried by an internal air service which, introduced in 1949, has done much to reduce the isolation of many of the outlying stations.

The first Legislative Council for the Colony was set up during Governor Moody's term of office consisting of four members, one of whom was non-official. Although the Legislature retained an official majority for many years, non-officials most of whom were farmers, played an important part in its deliberations.

The colonial form of government continues, headed by the Governor (the Commander-in-Chief) who is advised by the Executive Council. The Executive Council consists of the Governor, the Chief Secretary and the Financial Secretary (both ex-officio), two non-official Members appointed by the Governor and two Elected Members, elected by the Elected and Nominated

Members of the Legislative Council. The Legislative Council consists of the Governor, the Chief Secretary and Financial Secretary as ex-officio members, two Elected Members representing the Stanley constituency, two Elected Members representing the East and West Falkland constituencies respectively, and two Independent Members nominated by the Governor. The Constitution is about to be changed again to eliminate the non-elected members on the Legislative Council.

During the period 1948 to 1973, there was a biennially elected Town Council in Stanley consisting of six Elected Members and three Members nominated by the Governor.

THE FALKLAND ISLANDS DEPENDENCIES - GEOGRAPHY

The Falkland Islands Dependencies consist of two groups of islands, South Georgia, together with the Shag Rocks and the Clerke Rocks and the nine major South Sandwich Islands with off-lying smaller islands. All these islands lie between latitudes 53° and 60° South and longitudes 26° and 43° West. South Georgia lies some 800 miles ESE of the Falkland Islands.

South Georgia is dominated by a central mountainous ridge, running the length of the island and rising to 9,625 feet (Mount Paget) with glaciers flowing from it to the south western and north eastern coasts. More than three quarters of the island is glacierised or covered with perpetual snow. Snow lies at sea level for over half the year and the Islands' sub-polar climate is characterised by the almost perpetual circum-polar westerly winds, frequent precipitation, and heavy cloud.

Vegetation is restricted to lichens, mosses and a few hardy grasses. The only land mammal is reindeer, introduced in 1909. Almost all other animal life found on South Georgia depends on the sea for food. There are a number of species of seabirds, penguins and seals including fur seal and elephant seal, both of which have been commercially exploited in the past.

Until recent years the outstanding feature of South Georgia wildlife was the abundance of whales in the surrounding seas.

The South Sandwich Islands are volcanic, covered with glaciers and steep-sided. The few places where landing is possible tend to be actively volcanic and the group is practically uninhabitable.

FALKLAND ISLANDS DEPENDENCIES - HISTORY

South Georgia was sighted at least twice between 1675 and 1756 but the first landing was that of Captain James Cook in 1775 when he claimed it for King George III. Thereafter, South Georgia was visited by sealers of many nationalities exploiting both the elephant and fur seals. By 1815 the seal populations had been decimated. Whaling began in the twentieth century with the establishment in 1903 a shore whaling station by C. A. Larsen.

The Falkland Islands Dependencies were defined by Letters Patent of 1908 and 1917 and consisted not only of South Georgia and the South Sandwich Islands but also a sector of Antarctica lying between longitudes 20^{o} and 80^{o} West. By an Order in Council of 1962 this sector, south of latitude 60^{o} South and lying within the Antarctic Treaty Area, was separated from the Dependencies and was designated as the British Antarctic Territory.

An effective administration of the whaling industry in South Georgia was established from 1909 onwards. Most of the revenue from whaling was used to finance a major survey from 1925 until 1950 of the physical and biological oceanography of the Southern Ocean in an attempt to understand the population dynamics of the Antarctic whales. In 1925 the first pelagic whaling factory ship appeared in the Antarctic and thereafter whales were persistently caught at rates beyond the maximum sustainable yields. The last of the shore whaling stations on South Georgia closed down in 1965.

The Administration in South Georgia was maintained at King Edward Point until November 1969 when the Base Commander of the British Antarctic Survey scientific station became magistrate for the area. There is no regular sea communication with South Georgia or the other Dependencies apart from summer visits by British Antarctic Survey vessels and H.M.S. Endurance.

The Dependencies are subject to the authority of the Governor and his Executive Council. The Governor is empowered to legislate for the Dependencies.

CHAPTER 2 - POPULATION

Population changes

The most recent estimate of the population of the Falkland Islands (at December 31, 1975) suggests a total of 1,905[1]. About 94 per cent of the people are of British stock. Slightly over half of the population lives in the town of Stanley, and the remainder in some thirty-three settlements (the largest about 140 people and the average about 27) on East and West Falkland, and on some of the smaller islands.

Official census figures show that the population was 287 in 1851 and 1,789 in 1891. Thereafter it rose gradually to a peak of 2,392 in 1931 and has been declining since. Though the rate of decline rose to about 1 per cent per year between 1962 and 1972, (less acute than in some parts of the Highlands and Islands of Scotland) the population has fallen by only 5 per cent since 1901. Table 1 and Figure 4 reveal some important changes in segments of the total population.

Table 1. Population of Falkland Islands, 1901-1972

Year	Total	Stanley	East Falkland	West Falkland	Colonial* Shipping
1901	2,003	916	594	451	42
1911	2,176	885	723	553	15
1921	2,094	890	801	395	7
1931	2,392	1,213	702	426	51
1946	2,239	1,252	579	364	44
1953	2,230	1,135	642	453	-
1962	2,172	1,074	597	460	41
1972	1,957	1,079	498	380	-

* Falkland Island residents on board ships.

Source: FIG Census.

The population of the Camp declined by 20 per cent between 1953 and 1972, while that of Stanley remained stable. Another significant feature is that since 1946 census, the rate of decline in the number of locally born

1 Based on a calculation of change since the last census in 1972.

Islanders (the indigenous 'kelpers') has exceeded that of the total population. The contrast was especially marked between 1953 and 1962, when the population of the Islands as a whole declined by an annual average of 0.28 per cent, whereas for the native born stock the figure was 0.77 per cent. Table 2 reinforces the point.

Table 2. Origin by Birth of Population, 1953-1972

	Total FI Born	FI born as % of total population	UK born as % of total population	Others as % of total population
1953	1,863	83	14	3
1962	1,733	80	15	5
1972	1,522	77	17	6

Source: FIG.

The substantial loss of locally born people is believed to have resulted mainly from an exodus to New Zealand, which continued for several years.

Population change depends on two factors. One is natural change (births and deaths), and the other is migration.

Natural change

Births have exceeded deaths in the Falkland Islands in every year for which records exist (1906 onwards). Census figures for recent years are shown in Table 3:

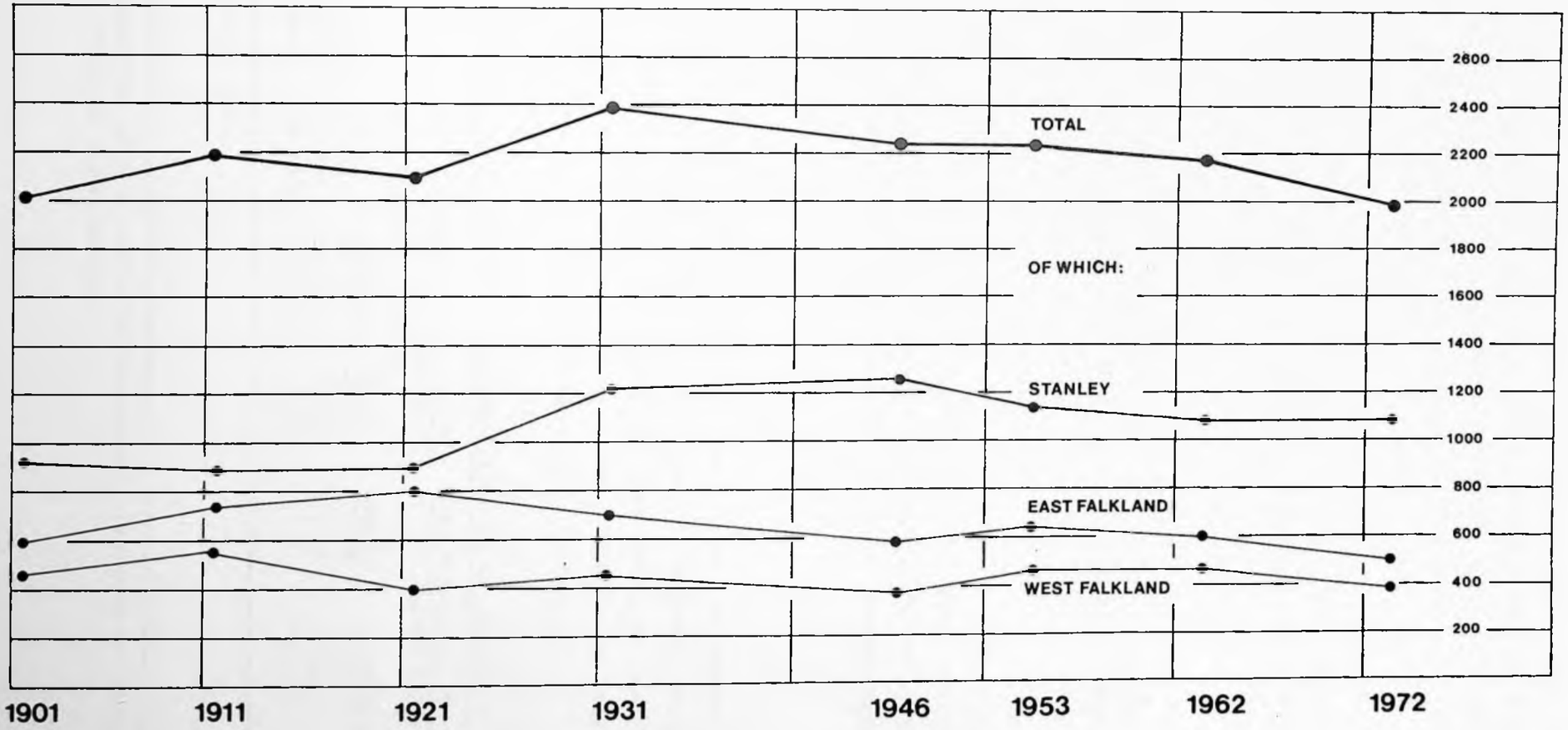
Table 3. Birth and Death Rates During the Period 1962 to 1972

Year	Births	Birth rate per 1,000	Deaths	Death rate per 1,000
1962	49	27.4	24	11.3
1963	44	20.6	24	11.2
1964	42	19.7	13	6.1
1965	52	25.0	18	8.6
1966	41	18.9	23	10.6
1967	37	17.1	21	9.7
1968	41	19.3	32	15.0
1969	58	27.6	23	10.9
1970	34	16.2	15	7.1
1971	38	18.6	20	9.9
1972	39	19.9	10	5.1

Source: FIG.

FIGURE 4

POPULATION OF THE FALKLAND ISLANDS



These crude birth and death rates shown do not tell the whole story. The situation is complicated by the presence of people - amounting to perhaps a fifth or more of the total population - who are on the Islands for a limited period, usually on a contract basis, most of whom are in the younger age groups. The women among them add substantially to the number of females of child-bearing age, so that the birth rate is high not because there are unusually large numbers of children per family (in fact fertility is not especially high), but because there is an unusually large proportion of families with children.

The presence of a short-stay group also affects the death rate, which is unusually low partly because this quite large proportion of the population does not die in the Islands. (Another factor is the high level of emigration of locally born people.)

It is not possible from the existing material to establish separate rates for the short stay people and those permanently resident, but it is clear that the birth rate for the indigenous stock is a good deal lower, and the death rate higher, than might be concluded from the census figures.[1]

Migration

The official migration statistics (based on arrivals and departures in the Islands) are not consistent with Census figures. However, calculations based on both sources show essentially the same important features, namely a rising rate of emigration by both sexes and, latterly at least, a distinctly higher level for females (see Table 4 below.)

Table 4. Annual Migration Patterns, 1946-52 to 1962-71

	Net migration: % per annum (established from arrivals' and departures' data)			Net migration: % per annum (from Census figures)		
	Males	Females	Total	Males	Females	Total
1946-52	+1.53	-0.87	-0.33	+0.10	-1.3	-0.52
1953-61	-1.59	-1.56	-1.58	-1.07	-1.64	-1.32
1962-71	-1.58	-1.95	-1.74	-1.71	-2.47	-2.05

Source: FIG.

1 Further work on this and other demographic features not clear from existing figures seems needed.

Even at the lower of the two figures quoted for recent years (showing net outward migration of 1.74 per cent), the loss to the Falkland Islands is considerable, and exceeds the greatest loss known for an area of Highlands and Islands during a similar period (NW Sutherland with minus 1.5 per cent per annum). Moreover, the figure relates to the total population of the Islands. Although it is not possible to calculate precisely the net migration of locally born Falkland Islanders, the indications are that the loss is considerably higher from this group. Taken with the lower birth rate and higher death rate, the decline of the indigenous stock seems confirmed as one of the most significant features of the population situation.

Official statistics of arrivals and departures suggest that since 1972, the loss through migration has fallen largely as a result of an apparent rise in immigration from 41 in 1973 to 98 in 1975. (Probably due to airfield construction work.) It is also possible that immigration legislation in Britain and New Zealand has reduced the number of emigrants from the Islands as compared with earlier years.

Assembly of more detailed data on emigration over the past three years (with the help of FIG staff and the registrar's department) suggests a much higher level of emigration of locally born people from West Falkland than from East Falkland in 1974 and 1975, a pattern which field investigations tended to confirm. Data on local people and contract personnel who had emigrated from the islands to the UK in 1975, are shown in Table 5 below.

Table 5. Local* Emigrants and Contract Personnel Returning to UK, 1975

A. Origins of local* emigrants

	From Stanley	From Camp	Total
Adult males	5	8	13
Adult females	17	7	24
Children	10	8	18
Total	32	23	55

B. Estimated ages of local* emigrants

Age	Totals
Children (age range unknown)	18
15-19	5
20-29	16
30-39	8
40-49	6
50-59	2

/Continued...

Table 5. Local* Emigrants and Contract Personnel Returning to UK, 1975 (contd)

C. Contract personnel and families returning to UK

	From Stanley	From Camp	Total
Adult males	16	11	27
Adult females	11	2	13
Children	11	2	13
Total	38	15	53

* 'Local' emigrants are locally born or long-term residents.

Source: FIG and Team.

The above table clearly suggests that the majority of migrants, are young (70 per cent under 30), that from among the locally born, women predominate, and that larger numbers migrate from Stanley. The last aspect contrasts with the stability of Stanley's total population from 1962 to 1972 compared with the decline in camp population but may be explained by differences in natural change and possibly higher immigration. A significant feature in regard to female emigration is that about two-fifths of the local women who left in 1975 were married to, or were about to marry, Royal Marines who had been stationed in the Islands. In a population as depleted of women (see below) as the Falkland Islands this represents a significant loss.

Age and sex structure

The age structure of the population is indicated in Table 6 which also makes comparisons with Scotland and N. Uist, a Scottish island.

Table 6. Falkland Islands Population Age Structure* in 1972 and Comparisons with Scotland and N. Uist, 1971

WHOLE GROUP	0-14	15-29	30-44	45-64	65+	Total
Ages:						
Total	523	439	421	415	159	1,957
% total	26.7%	22.4%	21.5%	21.2%	8.1%	
STANLEY						
Total	263	202	221	262	131	1,079
% total	24.4%	18.7%	20.5%	24.3%	12.1%	
CAMP						
Total	260	237	200	153	28	878
% total	29.6%	27.0%	22.8%	17.4%	3.2%	
SCOTLAND (1971)	26.5%	20.9%	17.5%	23.2%	12%	
ISLE OF N. UIST (1971)	26.1%	14.8%	15.9%	24.3%	18.8%	

* As Falkland Islands' Censuses have not grouped ages according to the conventional categories, it has been necessary to estimate these by interpolation for purposes of comparison.

Sources: FIG, HIDB and Team.

The above table demonstrates clearly the unusual age structure of the Islands' population, the most striking aspect of which is the low proportion (3.2 per cent) of persons aged 65 plus in the Camp, which is only about a quarter of the figure for Stanley (and about a sixth of that for a fairly representative Scottish island). This is explained by the fact that on retirement, at about 65, almost all farm workers vacate their houses and settle in Stanley. In spite of this inflow of older people, the proportion of elderly in Stanley is not high by normal British standards but it has increased slightly since 1962, and would doubtless have risen further without the relatively rapid fall in Camp population. Even now the proportion of persons aged 65 plus among the locally born people (excluding contract families' children) is an estimated 16 per cent, compared with 12 per cent for Stanley's population as a whole. This can probably be explained by outmigration of retired people and the influx of contract workers and their families; this demonstrates the sensitivity of these percentages to relatively small shifts in the population. Should emigration of young people from Stanley grow significantly, the population in the town could become markedly top-heavy.

Given the virtual absence of persons aged 65 plus, and the importation of labour, age structure in the Camp is of course distinctly 'bottom-heavy', with high percentages in the age groups under 44 and especially under 30.

The sex structure of the population is remarkable for the lack of females. Compared with the Shetland Islands, which have a relatively 'normal' population in this respect for peripheral areas of Britain, the structure in 1972 was as shown in Table 7.

Table 7. Falklands Islands
Population Sex Structure, 1972 and Shetland Islands, 1971

Age group:	0-14 (%)	15-29 (%)	30-44 (%)	45-64 (%)	65+ (%)
Male					
Falklands	50	54	61	60	48
Shetland	51	52	51	48	40
Female					
Falklands	50	46	39	40	52
Shetland	49	48	49	52	60

Source: FIG and HIDB.

In the Falkland Islands there was a significant surplus of males throughout the age range 15-64 years due of course to higher emigration by women and immigration of men on contract. The contrast is most striking in the age groups 30-44 and 45-64, in both of which males in the Falkland Islands exceed females by about three to two compared with an approximate balance in Shetland.

Although sex imbalance is certainly marked in Stanley, it is even more pronounced in the Camp. In West Falkland, for instance, the age group 20-29 in 1972 was made up of 71 per cent males and 29 per cent females. In East Falkland, males outnumbered females by two to one in the age range 30-39. In both islands there was a remarkable dearth of women aged 50-59, a possible explanation being the departure of men on retirement in their early 60's from Camp to Stanley, taking with them younger wives.

Marriage and divorce

An extremely low proportion of women aged 20 and over in the Falkland

Islands are single (8.1 per cent in 1972, compared to about 20 per cent for a fairly typical Scottish island). This contrasts with a rather high proportion of single males (27.6 per cent aged 20 or over). In West Falkland, for instance, where the preponderance of males is very marked, the chances of a young man finding a wife are distinctly limited. In 1972, there was only one unmarried woman over the age of 19 (and 51 single men).

Presumably related to sex imbalance (among other factors) is the very high level of divorce. From 1965 to 1974 there were 207 marriages and 56 divorces, a ratio of 3.7 to 1. In Scotland during the same period the ratio was 9.6 to 1.

CHAPTER 3 - THE ECONOMY

STRUCTURE OF THE ECONOMY

Main characteristics

Economic activity. The most striking feature of the economy of the Falkland Islands is its almost total dependence on the production of wool for export. The earnings from this trade finances the purchase from abroad of a high proportion of the goods consumed. Almost equally striking is the fact that sheep farming has formed the economic base since the 1870s, and that the few attempts to diversify or expand "downstream" (into mutton canning, freezing or livestock sales) have either failed or been short-lived. Moreover, the ranching type of farming, to which the Falkland conditions are naturally suited, does not easily respond to improvements in output or productivity through capital investment. Likewise, diversification into other types of farming, such as beef or dairy production or market gardening, is inhibited by the small local market, the absence of roads, and also the distance from export markets.

Effect of wool price. The dependence on wool means that the fortunes of the Islands are inextricably bound up with the health of the wool industry which, as with most other primary industries, is most vulnerable to changes in world market prices. Not only does government revenue from company taxation fluctuate wildly with wool prices, but it also lags some 15 months behind actual wool sales which, in inflationary times, adds the problem of lower real values to that of the inherent variability of tax income. The incomes of farm employees are also susceptible to changes in the price of wool because of the supplement to basic wages which is directly linked to the price of wool. Thus the world wool price is the economic variable which exerts the most influence on the inhabitants of the Islands. It is also a variable over which neither the sheep-farming industry nor the government has any control.

Import of goods. The dependence of the population on imports for most consumer goods (except meat, peat and vegetables), for some services and for capital investment, has a number of important consequences. First,

there are supply problems resulting in periodic shortages, restricted consumer choice and some underlying anxiety over the security of supplies. Secondly, and currently of greater significance, inflation is also imported along with the goods, but, except in the very short-term, it is beyond the Government's power to control.

The source of imported goods is largely restricted to the UK because of the nature of the external sea freight service. (See Chapter 10.) Aside from this link, which places British suppliers in a favoured position, the people's ties of loyalty, custom and kinship result in their exerting a strong preference for buying British. Since 80-85 per cent of imports originate from the UK, price rises in the UK largely determine the rate of Falkland Islands' inflation, the Falkland Islands £ being on a parity with the £ sterling.

Source of production. In both economic and physical terms there is a sharp distinction between Stanley and the Camp. The latter is the source of almost all production and the people working the sheep farms are located in small, widely scattered, farm-owned settlements or stations. By contrast, Stanley is a compact, small town which provides a large part of the Islands' public and private sector services.

Size of community. The very small population, coupled with the undiversified nature of the economy, results in a restricted choice of occupation or career. Acquiring the necessary advanced education or vocational training, or the search for wider job opportunities, inevitably takes many of the more talented and enterprising young people away from the Islands.

Another consequence of the small population, aggravated by its scattered distribution, is the burden of providing government services. The cost per head of population is high despite the fact that the range of services available is rather less than in most developed countries: no roads outside Stanley, negligible social welfare services, and no agricultural department. Moreover, in the Camp, many services (which in the UK would normally be provided by local government) are provided by the farms. The high per caput cost of the government and its services is a direct function of the size of the population and the need to maintain a minimum of expenditure

and staffing. In the case of the Falklands, the existing scale of manning could, with a few exceptions and some reorganisation, cope with a larger population.

Falkland Islands Company. The final important characteristic is the dominant position of the Falkland Islands Company in the Islands' economy. In the course of the report this fact will be illustrated under the chapter headings covering the various industries and activities of the Islands. Chapter 16 then discusses the financial performance and ownership of the company in terms of these activities, and the implications of its presence in the future development of the Falklands. It is necessary here to point out certain aspects of its dominant position. It owns nearly half the farm land and, through the holdings of its directors in other farms, has even wider influence over wool production: it provides the internal shipping service and runs the charter vessel which carries the wool and most imports; it holds wool auctions; it has a large market share in the wholesale and retail trades and provides the main, albeit rudimentary, banking service. In other words, the company has a monopoly in some sectors, and, in most others is very powerful.

There are often sound reasons why a monopoly situation should develop, some of which apply in this instance. In particular, the scale of some of the Islands' activities is so small as to leave no room for more than one enterprise. The advent of a second operator could only result in a serious under-utilisation of resources. As a natural consequence, competition is scarce or nonexistent.

It can be said that a socially responsible company does not misuse monopoly powers. But however benevolent it may be, any monopoly situation holds risks for a community as small as the Falklands. The lack of effective competition can insulate the community from pressures for change and for improvements in productivity. Potentially the most serious consequence however, results from the company's (this applies to the smaller companies as well as to the Falkland Island Company) having interests in the UK as well as in the Falklands. Decisions, affecting the Falkland Islands' economy, can therefore be taken on behalf of interests outside the Islands and by persons with perhaps little knowledge of the effect of their decisions on a small community.

Distribution of economic activity

Comprehensive information on the output of the Falkland Islands is lacking. Thus the structure of the economy can best be analysed using employment data. Even here there are serious limitations as employment in census surveys is classified by occupation, and not by economic sector. Table 8 below sets out an estimate of the distribution of employment by sector in 1974 based on our field investigations and on analysis of published data.

Table 8. Economic Activity
by Sector - Estimate of Distribution of Employment 1974
(percentage)

	Falkland Islands*	Scottish Highlands & Islands
Primary	46	10
Agriculture*2	46	
Secondary	-	14
Handicrafts & manufacture	-	
Tertiary	54	76
Building & construction*3	15	
Transport & docks*4	7	
Posts & telecommunications*5	2	
Water, electricity & municipal services	3	
Wholesale & retail trade	8	
Banking & financial services	2	
Education & medical services	5	
Government administration, police, judicial & defence	10	
Other Services*6	2	
All activities	100	100

* Based on full-time equivalents. Estimation and allocation of part-time employees is approximate only. *2 Includes fuel production in the form of peat cutting. *3 Includes handymen and carpenters on camp stations. *4 Excludes tractor and landrover drivers on farms who are allocated to agriculture, but includes Argentinian LADE personnel. *5 Includes meteorology. *6 Domestic service, ministers of religion etc.

Sources: EIU and Highlands & Islands Development Board.

The dominant position of agriculture would appear even more pronounced if it could be expressed in terms of capital employed, as the level of capital employed in property, stock and machinery per employee is almost certainly higher, than in tertiary sector service activity. Nevertheless, the picture is of an economy heavily dependent on primary production, virtually without industry, supported by a range of public and private sector services. About half of the services are run by government, including administration and defence, the internal air service, posts and telecommunications, water, electricity and municipal services, and education and medical services. As mentioned previously, the Falkland Islands Company dominates the private service sector in sea transport, wholesale and retail trade.

National income

The data available only permitted the analysis of the Falkland Islands national income to be based on income statistics, as distinct from those of expenditure or output. National income is the sum of incomes (avoiding double-counting) accruing to individuals, companies and government as a result of economic activity in the Islands. The sum must be adjusted for any outflow of funds arising from the transfer abroad of incomes (profits and dividends) net of income to the Islands from assets abroad.

Our best estimates of Falkland Islands national income are set out in Tables 9 and 10. In the former, the values are in current prices, but in Table 10, the values have been adjusted to 1974 prices so as to permit analysis over the period. It must be pointed out that we have used a format similar to that used in calculating UK national income but which differs in some respects from that used in previous reports on the economy of the Falkland Islands. The main differences are that all forms of UK assistance have been excluded, these being in the nature of capital transactions, as has the (very small) dependencies contribution from South Georgia[1]. On the other hand, estimates of the value of income in kind (mutton, peat, milk and free accommodation) and of the rental value of owner-occupied houses have been included.

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1 The national income data relate to the Falkland Islands excluding the Dependencies, in which economic activity is currently negligible, comprising only the operations of the British Antarctic Survey. For the sake of convenience, in economic terms, it is assumed that the contribution matches the value of government administrative services rendered from the Falkland Islands.

Table 9. Falkland Islands' National Income 1965 to 1974 at Current Prices
(£000's)

	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974
Wages & salaries & incomes of sole traders & farmers*	732.1	804.7	831.8	872.0	883.1	886.0	890.9	898.1	1,086.0	1,361.3
Payments in kind*2	55.7	60.6	61.8	61.8	62.3	66.6	70.4	80.3	89.9	102.6
Pension contributions by employers	9.5	8.2	11.2	13.5	12.9	12.1	12.3	11.3	13.2	24.7
Gross trading profits of companies*3	306.6	364.3	198.8	217.3	265.0	182.0	69.1	444.1	776.4	1,119.1
Rents*4	33.4	38.4	38.2	38.2	38.4	50.0	49.7	52.3	62.4	70.4
GROSS DOMESTIC PRODUCT	1,137.3	1,276.2	1,141.8	1,202.8	1,261.7	1,196.7	1,092.4	1,486.1	2,027.9	2,678.1
Less net investment & property income to abroad*5	177.0	184.7	60.8	104.8	70.8	89.4	18.6	183.9	378.3	480.4
Plus Government investment & philatelic income*6	48.9	75.4	118.1	91.2	54.6	191.4	192.8	124.5	139.9	110.1
GROSS NATIONAL PRODUCT	1,009.2	1,166.9	1,199.1	1,189.2	1,245.5	1,298.7	1,266.6	1,426.7	1,789.5	2,307.8
Less depreciation*7	94.7	89.9	85.0	80.1	77.0	79.7	78.9	131.7	54.7	98.9
NATIONAL INCOME	914.5	1,077.0	1,114.1	1,109.1	1,168.5	1,219.0	1,187.7	1,295.0	1,734.8	2,208.9
Population	2,079	2,164	2,122	2,105	2,098	2,045	2,020	1,957	1,874	1,897
NATIONAL INCOME PER HEAD £	439.9	497.7	525.0	526.9	557.0	596.1	588.0	661.7	925.7	1,164.4
Wool price average London (pence/kilo)	44.05	45.11	37.43	39.60	41.99	36.77	31.95	50.35	73.00	111.00
Value of wool exports	1,003.9	998.4	783.0	810.8	877.7	771.7	651.9	1,095.4	1,462.7	2,225.2

* Includes total Falkland Island spending by Royal Marine detachment personnel. *2 Free accommodation, mutton and peat to camp employees. *3 Before providing for depreciation. *4 Government house rents and estimates for value of owner occupied houses in Stanley. *5 Net profits of companies from FI activities after FI tax less capital expenditure in FI (i.e. dividends and unappropriated profits remitted abroad). *6 Income from FI Government investment (overseas) including transfers from savings bank. Philatelic income mainly from abroad. *7 This is an approximation based on depreciation of company assets only.

Source: FIG.

Table 10. Falkland Islands National Income 1965 to 1974 at Constant 1974 Prices*
(£000's)

	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974
Wages & salaries & incomes of sole traders and farmers*2	1,530.1	1,617.5	1,588.7	1,569.6	1,527.8	1,461.9	1,363.1	1,302.3	1,292.3	1,361.3
Payments in kind*3	116.4	121.8	118.0	111.2	107.8	109.9	107.7	116.4	107.0	102.6
Pension contributions by employers	19.9	16.5	21.4	24.3	22.3	20.0	18.8	16.4	15.7	24.7
Gross trading profits of companies*4	640.8	732.2	379.7	391.1	458.5	300.3	105.7	644.0	923.9	1,119.1
Rents*5	69.8	77.2	73.0	68.8	66.4	82.5	76.0	75.8	74.3	70.4
Wool export price adjustment*6	438.0	463.0	818.0	824.0	809.0	1,066.0	1,262.0	826.0	483.0	0.0
GROSS DOMESTIC PRODUCT	2,815.0	3,028.2	2,998.8	2,989.0	2,991.7	3,040.6	2,933.4	2,980.9	2,896.2	2,678.1
Less net investment & property income to abroad*7	445.8	454.9	180.4	293.6	187.3	270.1	64.6	405.1	574.9	480.4
Plus government investment & philatelic income*8	102.2	151.6	225.6	164.2	94.5	315.8	295.0	180.5	166.5	110.1
GROSS NATIONAL PRODUCT	2,471.4	2,724.9	3,044.0	2,859.6	2,898.9	3,086.3	3,163.8	2,756.3	2,487.8	2,307.8
Less depreciation*9	197.9	180.7	162.4	144.2	133.2	131.5	120.7	191.0	65.1	98.9
NATIONAL INCOME	2,273.5	2,447.1	2,783.5	2,676.2	2,765.7	2,954.8	3,043.1	2,565.3	2,422.7	2,208.9
Population	2,079	2,164	2,122	2,105	2,098	2,045	2,020	1,957	1,874	1,897
NATIONAL INCOME PER HEAD £	1,093.6	1,130.8	1,311.7	1,271.4	1,318.3	1,444.9	1,506.5	1,310.8	1,292.8	1,164.4
Memorandum items										
Falkland Islands cost of living index (1974=100)	48	50	52	56	58	61	65	69	84	100
Wool price index (1974=100)	39.7	40.6	33.7	35.7	37.8	33.1	28.8	45.4	65.8	100
Value of wool exports, 1974 prices	2,529.0	2,659.0	2,323.0	2,271.0	2,322.0	2,331.0	2,264.0	2,413.0	2,223.0	2,225.2

* Using the Falklands Islands cost of living index as deflator except that wool exports and income paid abroad are deflated by the wool price index. *2 Includes total Falkland Island spending by Royal Marine detachment personnel. *3 Free accommodation, mutton and peat to camp employees. *4 Before providing for depreciation. *5 Government house rents and estimates for value of owner occupied houses in Stanley. *6 Components of GDP other than exports are deflated by the retail price index in the absence of more comprehensive indices. For wool exports however an index of wool prices is available as a deflator in place of the retail price index. This now gives the adjustment required as a result of the substitution of the wool price index for the retail price index when deflating the value of wool exports. *7 Net profits of companies from FI activities after FI tax less capital expenditure in FI (i.e. dividends and unappropriated profits remitted abroad), deflated by wool price index. *8 Income from FI Government investment (overseas) including transfers from savings bank. Philatelic income mainly from abroad. *9 Approximation based on depreciation of company assets only.

Source: FIG, and team estimates.

UK assistance has been excluded from the Falkland Islands national income, although it undoubtedly contributes to the income of the community as a whole. This treatment is in accordance with international convention which excludes development assistance from national income, on the grounds that it does not represent an income arising from productive activities. National income can represent either the output of the community produced within its borders (Gross Domestic Product), or the income the community earns from productive activities, including net income from assets in other countries (Gross National Product). But on either basis, financial transfers from other communities are not included as part of national income.

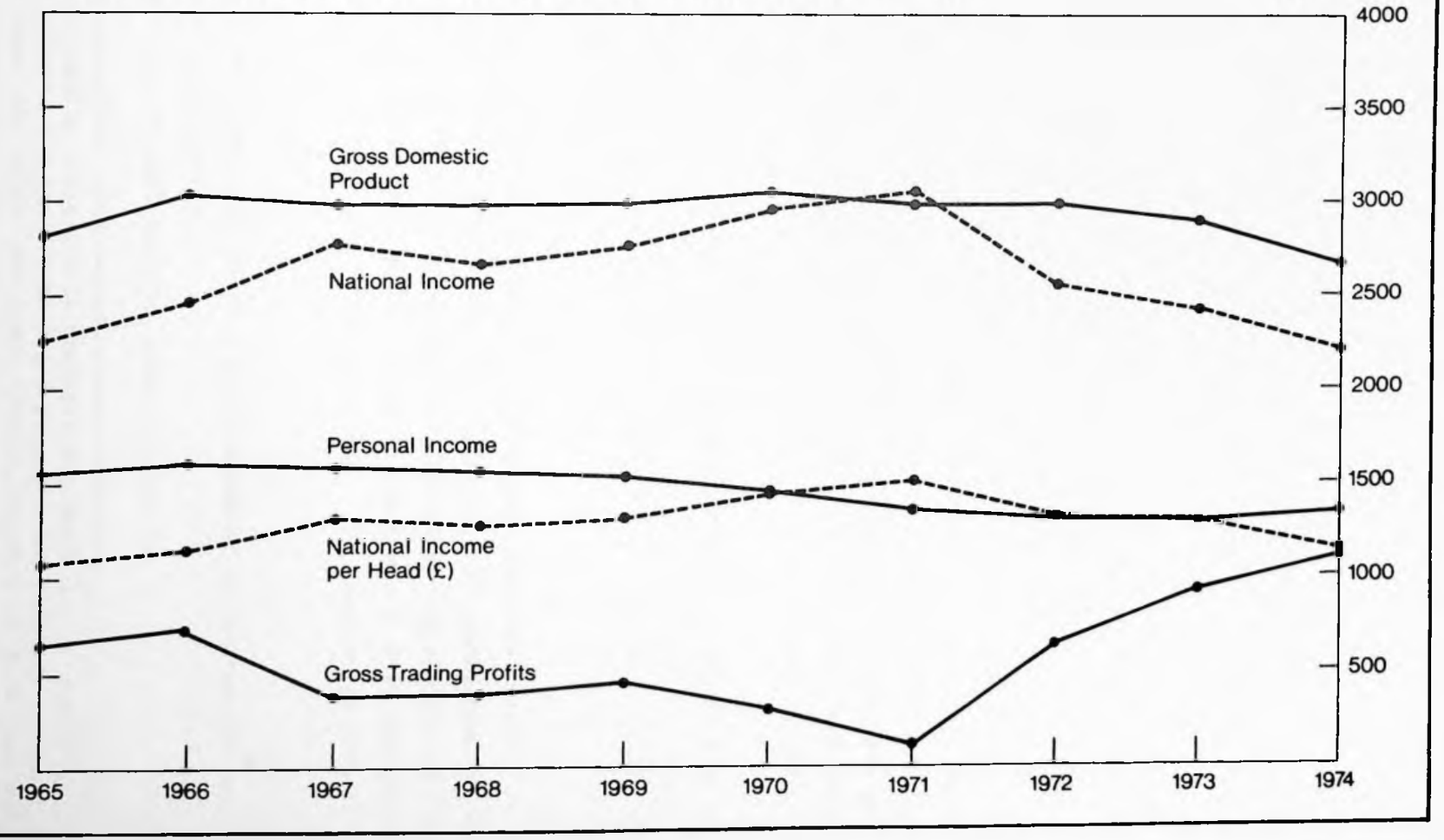
The importance of UK financial assistance is discussed below in the context of a comparison between the inflow of government assistance on one hand, and, on the other hand, the net outflow of private sector income. At a later point (in the section on Incomes, in particular Table 17) we compare income per head in the Falklands with income per head in the UK, and for that comparison it is necessary to consider the effect of UK government assistance on income.

The main components of national income for the ten year period 1965 to 1974 are set out in Figure 5. In this and Table 10, the deflator used is the local retail price index, except for elements comprising exports and property income paid abroad, which are both deflated by the wool price.

Overall it can be seen that the picture is one of static or declining growth. It is to be noted that the year-to-year changes in the line showing wool export price adjustment are approximately equal in magnitude but opposite in sign to the changes in gross company profits, the latter being the element of national income most affected by fluctuations in wool prices. The fact that profits do not appear to have increased as substantially in 1974 as might have been expected from the rise in wool prices, is probably due to the fact that some of the additional income is not reported until the following financial year. The decline in the 1974 national income is, therefore, most probably exaggerated.

NATIONAL INCOME IN CONSTANT 1974 PRICES (£ thousands)

Figure 5



This static picture essentially reflects the fact that there has been little change in either wool output, or the level of activity in other sectors of the economy.

The sharp fluctuations in gross trading profits[1] have been responsible for the considerable variation in the value of Gross Domestic Product. These, however, have not been reflected in variations of similar magnitude in National Income because the fluctuations in government investment income and philatelic income have partially cancelled out the fluctuations in gross trading profit.

There are important features of the Island's national income accounts. The first is that, when wool prices are high, gross trading profits represent (by international standards) a very high proportion of total national income. For instance in 1974, gross trading profits were 42 per cent of Gross Domestic Product. Other good years were 1965, 1966, 1972 and 1973. On the other hand, profits in 1971 amounted to only 4 per cent of GDP.

The second is the high proportion that income from exports occupies of total national income.

External flow of funds

This aspect of the Islands' national income account deserves special attention. Over the ten year period corporate profits[2] transferred abroad have totalled 12 per cent of Gross Domestic Product during the period. In individual years the proportion has varied in the range 5 to 19 per cent with one exceptional year as low as 2 per cent. The reasons for this situation are:

- the relatively low level of new investment in agriculture or trading activities;
- the lack of institutional means for saving;

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1 Company accounting years run to December 31, March 31, or June 31. The wool is clipped between December and February and shipped between January and June, but sales take place between December in that year and the following December. Thus invariably one year's production of wool does not reflect on profits until the next or even succeeding accounting year. 2 Only profits attributable to companies registered abroad and dividends paid to non-Falkland Island residents have been included. Some FI pension payments also transferred abroad have been excluded.

- the limited opportunities for investment in other sectors of the Falkland Islands economy or in new ventures under present circumstances.

The funds transferred have been used mainly in the UK for private consumption, and for investment in equities, government stock or property. A considerable proportion of the funds has accrued to the UK Exchequer, partly as company taxes, partly as income tax on dividends paid to individuals resident in the UK. The latter is the more important, but the contributions of both to the UK Exchequer are worth examining as offsets against UK government assistance to the Falklands.

It is necessary initially to establish, if only roughly, the proportion of after-tax profits distributed by way of dividend. In a later section (INVESTMENT) this is examined in some detail. It is shown there that in the five-year period, 1970-74, the Falkland Islands Company distributed 96 per cent of its profits after tax. Another nine companies, including most of the larger companies, distributed 59 per cent of their aggregate after-tax profits, during a similar period. Because the Falkland Islands Company is so much larger than the other nine companies combined, a reasonable approximation would be to assume that 90 per cent of aggregated after-tax profits earned in the Falklands are distributed by way of dividend. Finally it is assumed that this same proportion applies to funds transferred to the UK.

Taking company tax first, although tax paid to the Falkland Islands Government can be offset against tax payable in the UK by UK registered companies, the higher rate of UK tax (52 per cent as against 40 per cent in the Falklands) normally ensures that the UK exchequer receives some tax payments on income derived from Falkland Islands production. The exact tax benefit to the UK cannot be determined with precision, because depreciation allowances are much more generous in the UK than in the Falklands. If the additional "effective" tax on profits of UK registered companies was assumed to be 5 per cent, then the contribution to the UK exchequer in 1974 would have been about £50,000. However, 1974 was an exceptionally good year for profits. Calculated on the same basis the average company tax

"take" of the UK exchequer from the income arising in the Falklands of UK based companies in the 24 year period 1951-74 was at least £20,000 per annum, i.e. £480,000 for the whole period.

Taxes on dividends provide the more significant contribution. Dividends paid by the FIC are passed on in the first instance to the parent company, but ultimately can be regarded as being distributed to individual shareholders, as also are the dividends paid by the smaller companies. On the assumption that the outflow of company funds of £480,000 in 1974 was 90 per cent distributed by way of dividends and applying a conservative tax rate of 35 per cent, the gain to the UK tax authorities was approximately £150,000.

Using the same assumptions, and applying the same average tax rate[1] the outflows of company funds from the Falklands in the 24-year period 1951-74 have yielded £1,590,000 to the UK exchequer.

Thus on the assumptions stated the total estimated direct benefit to the UK exchequer of the company taxes, and personal taxes on dividends, arising from the Falklands operations of UK companies in the period 1951-74 was £2,070,000 at current prices. During the same period UK Government assistance to the Falklands totalled £2,606,000 at current prices (see Table 11).

It must be pointed out, however, that this excess of UK assistance arose only in the final year of the period (1974) when UK Government assistance totalled £1,676,000 largely because of the grant given for the building of the permanent airfield. If the period 1951-73 is taken, and calculations made on the same assumptions, the direct benefit to the UK exchequer from funds generated in the Falklands amounts to £1,898,000 while UK assistance in the same period totalled £929,900. Thus in the 23 years up to 1973 it would seem that the Falklands effectively contributed to the UK exchequer more than twice the amount they received by way of assistance at current

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1 Although the UK standard rate of tax on personal incomes has fluctuated considerably during the period, 35 per cent is not an unreasonable average to take since some of the recipients of dividends would undoubtedly have been paying not just the standard rate of tax but, in earlier years, surtax and, more recently, the investment income surcharge.

prices. Expressed at constant 1974 prices the balance in favour of the Falklands would, of course, be very much greater because the bulk of the UK assistance (see Table 11) was received in the 1970's whereas aid was more modest in earlier years.

While the foregoing calculations are necessarily approximate they serve to illustrate the scale of direct contribution made by the Falkland Islands to the UK exchequer over the years.

A further point is that the UK Government can also expect a continuing stream of tax receipts on future income earned on the funds transferred from the Falklands to the UK. But clearly it would be impossible to quantify these and in any case financial assistance by the UK to the Falklands also generates a continuing income stream to the benefit of Falkland Islands tax revenues.

The net outflow of investment and property income is smaller because of inflows from FIG investments abroad, and the true gap is represented by the difference between GDP and GNP. In some particularly depressed years (1967, 1970 and 1971) there has actually been a net inflow.

If there is any one cause of the decline in population and in the Falkland Islands economy, it is this drain of resources from the Falklands to the UK. Given the choice between local reinvestment of after-tax profits and investment in the UK, the companies have chosen the latter option. (Some of the reasons for this are examined later.)

The damaging effects of this income outflow might have been overcome by an equal inflow of capital assistance from the UK government. (In terms of national income accounting, one is an income flow, the other a capital transfer, and so excluded from national income. But when considering the effect on capital formation in the Falklands, it is reasonable to offset one flow against the other.) In practice, however, the inflow of UK government assistance has in most years been less than the total outflow of company income. This is shown in Table 11 which compares, over a 24 year

Table 11. Estimate of Outflow of Funds from Company Activity in Falkland Islands Compared with UK Government Assistance - 1951-74
(£'000's)

	Company Funds*		UK Government Assistance*3	
Year	Actual	1974 prices*2	Actual	1974 prices*2
1951	896.7	2,789	15.9	49
1952	120.4	347	19.9	57
1953	258.2	718	10.2	28
1954	297.1	811	6.0	16
1955	295.9	790	30.7	82
1956	35.3	97	8.1	22
1957	191.8	512	59.7	159
1958	73.9	197	18.0	48
1959	144.7	382	4.3	11
1960	187.5	474	29.0	73
1961	196.7	474	16.4	40
1962	118.3	279	7.9	19
1963	244.6	550	7.4	17
1964	236.4	506	11.9	25
1965	177.0	370	11.2	23
1966	184.7	371	40.2	81
1967	60.8	116	53.4	102
1968	104.8	189	28.9	52
1969	70.8	122	27.9	48
1970	89.4	148	94.8	156
1971	18.6	28	52.3	80
1972	183.9	267	161.3	234
1973	378.3	450	214.5	255
1974	480.4	480	1,676.8	1,677
Total	5,046.2	11,467	2,606.7	3,354

* Based on net profit arising from all company activities in Falkland Islands, plus depreciation, less FI tax, less capital investment in Falklands. The sum for each company reduced by proportion of shares held by persons resident in Falkland Islands. (Approximates to dividends and unappropriated profits remitted abroad). *2 Based on Falkland Islands cost of living index. *3 UK Development Aid, UK Technical Assistance, Overseas Service Aid scheme less, since 1972, salary supplements paid in UK. These supplements amounted to approximately £38,000 for the three years 1972-74. In 1974 prices, this is equivalent to about £42,000. Foreign and Commonwealth Office payments for the Governor and his personal assistant since 1970 would add a further £36,000 over the three years.

Source: FIG Estimates and ODM.

period from 1951 to 1974, the outflow of company funds attributable to non-Falkland Island residents with the inflow of capital assistance from the UK Government. The results are set out in both actual and real terms.

The table shows that, valued at present day prices, the outflow of company funds has been some three and a half times the inflow of government assistance between 1951 and 1974[1]. The imbalance was, however, much greater in the 1950s than in the 1960s. Indeed for the latest ten-year period, total inflows exceeded outflows, because of heavy aid expenditure in 1974.

Any comparison such as that made in Table 11 must be subject to a number of provisos and qualifications. Some of these are listed in the footnotes to the table. In addition, there are outflows and inflows not included in the table for one reason or another, quite apart from Falkland Islands Government investment and philatelic income (investment income could be considered as largely an outcome of the inadequacy of local investment opportunities for F.I. Government reserves). Other elements affecting external flow of funds are:

i. savings, particularly those of Falkland Islanders;
ii. non-financial inflows of UK government services, such as the presence of the detachment of Marines (although the FIG makes a contribution to the cost of these) and the presence of naval vessels, in Falkland Islands waters;[2]

Although it is extremely difficult to obtain a precise estimate of net financial flows between the UK and the Falklands, the following general points can be made:

a. There is a continuing and substantial outflow of company income from the private sector, closely related to the fluctuating returns from wool sales.

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1 It should be noted that further heavy aid expenditure by the UK Government, of up to £3 million, is due on the new permanent airfield in 1975 and 1976.

2 We are not in a position to quantify such "defence" costs relative to the Falkland Islands. These, in any case, cannot be considered in isolation from other UK scientific support activities in the southern Atlantic and the Antarctic region.

b. Government investment income, plus UK government assistance, has, at least in recent years, more or less compensated for the private sector outflows. But from the point of view of capital formation, public sector funds tend to be directed towards infrastructure investment rather than towards more immediately productive investment in agriculture or elsewhere. The outflow of company income must limit the future growth of the private sector of the Falkland Islands economy.

c. Fiscal policy should be designed so as to encourage the retention and reinvestment of company profits. In particular it should be recognised that, in the long term, there can be little justification for any future UK aid related to the private sector, if its sole net effect is to increase the remittance of profits to the UK.

EXTERNAL TRADE

Exports

The export statistics emphasise the extent to which the Falkland Islands are a "one-crop economy". Table 12 below shows that in every one of the last 10 years the products of sheep farming have accounted for over 99 per cent of the value of exports. Wool is by far the most important item. Trade in skins is very small, and there are no exports of mutton. Except for 1973, when live sheep were exported to Argentina and Lebanon all exports are shipped to UK.

The volume of exports of wool has remained steady, apart from a very slight decline in the early 1970s. The value, however, has fluctuated sharply as a result of variations in world wool prices.

Both sheep skins and hides are exported but there has been a marked fluctuation in both the volume and value of exports, the trend being sharply downwards since 1971. This situation reflects both low prices and less intensive shepherding. In the last few years few cattle hides have been sold because of the depressed state of the market. Both skins and hides are sold in a dried and salted form, there being no skin pickling (fell-mongering) plant on the Islands.

Mink sales from the FIC farm lasted only two years (1965 and 1966) before the project was closed.

Wild life exports consist mainly of penguins, sea elephants and the occasional seals to zoos. There have been no exports since 1972, due to adoption by the Government of a restrictive attitude to issue of licences.

Table 12. Falkland Islands Exports and Re-Exports* - 1965-1974
(£'000)

Item	1965		1966		1967		1968		1969		1970		1971		1972		1973		1974	
	£	Kg	£	Kg	£	Kg	£	Kg	£	Kg	£	Kg	£	Kg	£	Kg	£	Kg	£	Kg
Wool	1,003.9	2,195.9	998.4	2,209.1	783.0	2,008	810.8	2,045.6	877.7	2,117.7	771.7	2,095.4	651.9	2,053.9	1,095.4	2,008	1,462.7	2,007.9	2,225.2	2,004.7
Hides/Skins	20.4	230.3	36.6	152.1	17.8	162.7	29.1	160.3	27.7	140.2	28	126.8	24.3	172.6	18.2	155.4	17.6	85.1	11.4	72.5
Mink Pelts	1.2		2.9		-		-		-		-		-		-		-		-	
Wild Life	0.7		-		1.1		1.7		3.4		3.2		-		4.7		-		-	
Iron & Steel Scrap2	-		-		-		-		1.7		1.1		3.0		0.5		3.3		2.6	
Empty Drums*2	-		-		-		-		5.9		4.1		4.0		-		-		-	
Livestock (sheep)	-		-		-		-		-		-		-		-		59.9		-	
Total	1,026.2		1,037.9		801.9		841.6		916.3		807.9		683.2		1,118.8		1,543.5		2,239.2	

* Goods returned for repair have been excluded. *2 Information on re-exports of iron and steel scrap and empty drums is not available for 1965 to 1968

Source: FIC.

Table 13. Falkland Islands Imports, 1968-74

SITC classification	1968		1969		1970		1971		1972		1973		1974	
	£'000	%	£'000	%	£'000	%	£'000	%	£'000	%	£'000	%	£'000	%
0 Food and live animals*	137.9	23.0	119.7	23.5	130.9	21.4	116.9	19.3	137.2	21.1	129.8	22.7	197.0	24.6
1 Beverages and tobacco	73.5	12.3	52.6	10.3	66.2	10.8	64.4	10.6	60.5	9.3	62.7	8.4	118.3	14.7
2 Crude materials - inedible	9.9	1.7	11.9	2.3	8.8	1.4	5.1	0.8	6.1	0.9	36.4	6.4	64.3	8.0
3 Mineral fuels, lubricants, etc.	35.4	5.9	39.5	7.8	40.1	6.6	57.5	9.5	26.8	4.1	39.2	6.9	56.3	7.0
4 Animal and vegetable oils & fats	0.4	0.1	0.5	0.1	0.5	0.1	1.0	0.2	0.3	0.04	0.2	0.04	1.1	0.1
5 Chemical products	40.5	6.7	32.2	6.5	38.0	6.2	37.9	6.2	41.2	6.3	44.5	7.8	46.3	5.5
6 Manufactured goods	121.4	20.3	77.1	15.1	92.9	15.2	104.8	17.3	111.2	17.1	94.3	16.5	149.5	18.6
7 Machinery & transport equipment	80.6	13.5	63.5	12.5	104.5	17.1	123.6	20.4	165.6	25.4	81.8	14.3	62.4	7.8
8 Miscellaneous manufactured articles	99.1	16.6	111.6	21.9	121.0	19.8	93.9	15.5	102.7	15.8	82.1	14.4	110.0	13.7
9 Miscellaneous transaction*2	0.3	0.05	0.3	0.05	7.4	1.2	1.7	0.3	-	-	-	-	-	-
	598.9	100.0	509.0	100.0	610.4	100.0	607.0	100.0	651.6	100.0	571.0	100.0	805.2	100.0

* Mainly provisions. *2 Includes goods returned after repair.

Source: FIG

Imports

Most imports are carried in the charter vessel which visits the Islands four times a year from London, at approximately three month intervals. Some high value goods, such as watches and cameras, are imported by parcel post using, since 1972, the LADE air service from Comodoro Rivadavia in Argentina. Table 13 shows the Islands' imports from 1968 to 1974 classified into broad SITC headings.

As is to be expected with a territory totally dependent on imports for most of its consumption and capital goods, the statistics show a balanced spread between the various types of goods required by a reasonably well-off farming community. Over time, the value of imports in real terms shows a slight downward trend. The year to year fluctuations mainly reflect variations in the volume of capital goods.

Against the general trend, there was the sharp increase in the value of petroleum imports in 1973 and 1974 and, in 1974, a rise in imports of drink, photographic equipment and watches. This is attributable to the substantial sales to visitors off tourist ships in that year, and early in 1975. (See Chapter 12.)

Table 14 shows the origin of imports over the last seven years and demonstrates the prominent position of the UK, accounting for between 79 and 84 per cent of all imports in value terms.

For some UK imports, however, the real country of origin is continental Europe, the US or Japan, the British distributor or wholesaler merely being the trader. Over the seven year period, the main change is the increasing importance of trade with Argentina, particularly since the introduction of the LADE air service. This has partly been at the expense of Uruguay following the termination of the regular sea service to Montevideo with the withdrawal of the SS Darwin in 1972. Table 15 shows the Falkland Islands' balance of trade as having remained strongly in surplus although the size of the surplus has varied. The rise in the surplus in 1973 and 1974 is mainly a function of higher wool prices. A fall in this value can be expected for 1975 for the same reason. Estimation of the Islands' balance

Table 14. Falkland Islands' Imports, Distribution by Area of Origin, 1968-1974
(percentage)

Country	1968	1969	1970	1971	1972	1973	1974
United Kingdom	79.1	82.2	84.3	83.3	84.2	79.0	82.3
Argentina	3.8	3.0	2.9	1.2	8.4	11.5	12.4
Japan	1.3	1.5	2.2	1.8	1.4	1.9	2.4
Uruguay	4.5	7.4	4.9	1.8	-	-	-
Chile	5.4	1.0	0.6	1.0	1.0	3.4	1.9
Germany	-	0.8	0.6	0.8	0.6	0.6	0.5
Switzerland	0.9	1.0	1.2	0.8	0.7	0.8	0.3
Holland	1.5	-	1.3	1.8	0.4	0.4	0.2
India				-	0.7	1.4	-
Other countries	3.5	3.1	2.0	7.5	2.6	1.0	
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Note: No entry under countries listed implies a low value of imports from that country for the year in question; and inclusion under Other countries.

Source: FIG.

Table 15. Falkland Islands Balance of Trade, 1968-1974
(£'000)

	1968	1969	1970	1971	1972	1973	1974
Exports	842	916	808	683	1,119	1,544	2,239
Imports	599	509	610	607	652	571	805
Trade surplus	243	407	198	76	467	973	1,434

of payments, either on current or capital account, has not proved possible because information is lacking on current and capital transfers, on spending abroad by Falkland Islands' residents, on private sector investment income from abroad, and on private sector money balances held abroad.

INCOMES AND CONSUMPTION

Incomes

Throughout this section comparisons will be made with the UK. Such a comparison provides a familiar reference base. However, it is also important to demonstrate the size of the incomes differential since any significant erosion of real incomes and the relative standard of living in the Falkland Islands would tend to accelerate the rate of emigration and make more difficult compensatory recruitment in the UK.

Broadly speaking seven classes of income can be identified according to occupational status. These are:

1. Stanley employees. In receipt of a basic wage, plus a flat rate cost of living addition, and with opportunities for income supplement from dangerous or unpleasant work and from overtime.

2. Camp employees. In receipt of a basic wage, plus a flat rate cost of living addition, plus a bonus payment related to the price of wool (a form of industry-wide profit sharing) and with opportunities to earn on piece work conditions by "going on contract" to carry out specific measurable tasks (e.g. fencing, shearing, ditching, peat cutting).

3. Salaried employees (Government and company employed). In receipt of a basic salary plus a graduated cost of living addition. Expatriate employees with government also receive free passages to UK and a salary supplement (OSAS) payable in the UK.

4. Trade In receipt of profits from retail trading or the provision of personal services.

5. Part-time employment (mainly in Stanley). In receipt of wages, salary or a negotiated contract price for a specific activity (e.g. peat cutting). In the case of wages or salaried employment the pay is related to, although at times somewhat lower than, the emoluments payable to a full-time employee.

6. Pensioners. In receipt of a pension. This has tended to lag behind rises in the cost of living.

7. Unearned income. Income from investments in the Government Savings Bank, or in equities and loans abroad. In 1974, gross unearned income totalled £117,800 but only five persons were wholly dependent on unearned sources.

In addition to cash income, payment of income in kind is widespread. In the camp, employees, including managers, receive free peat, milk, mutton, accommodation and vegetable gardens. The range of perquisites is much less in Stanley but does include the right to cut peat on Stanley common and, in the case of government employees, subsidised rented accommodation is available.

As with many other small and isolated communities, individuals in Stanley frequently have more than one occupation and source of earned income. This is more a feature of the local market being too small to permit successful operation of service trades on a full-time, commercial basis, rather than any indication of a serious labour shortage. The relative absence of spare-time recreational opportunities, such as television, make Islanders more willing to take on part-time, out-of-hours work than the average UK wage-earner. Indeed, some individuals in Stanley are known to have as many as four part-time jobs.

The distribution of incomes in 1974 is set out in Table 16 which shows the numbers of persons within each income range for both gross and after tax income.

Table 16. Distribution of Falkland Islands Incomes - 1974
(£)

Income range*3	Earned income gross*	Total income after tax*2
Below 500	125	130
500- 999	196	253
1,000-1,499	328	303
1,500-1,999	123	106
2,000-2,499	56	59
2,500-2,999	36	22
3,000-3,499	16	15
3,500-3,999	10	5
4,000-4,499	6	8
4,500-4,999	7	1
Over 5,000	6	12
Total number	909	914*4
Total income	1,213,492	1,173,905
Average income	1,335	1,284
Median income	1,150	1,082

* Includes benefits in kind, as assessed for income tax purposes, of £15,952. *2 Includes benefits in kind, as assessed for income tax purposes, and unearned income. *3 Number within ranges (mainly lower) includes individuals assessed for a part year only. The numbers are thought to be small and to have only a marginal effect on the distribution pattern. *4 This total includes 5 persons with no earned income.

Source: FIG.

In Table 17 a number of income indicators compare the situation with the UK and also the Scottish Highlands and Islands.

Table 17. Comparative Income Indicators - Falkland Islands and United Kingdom - 1974
(£)

	Falkland Islands	United Kingdom	Scottish Highlands & Islands
National income per head	1,164	1,300	na
Average pre-tax earnings per tax payer	1,335	2,550	1,420*3
Average earned & unearned income after tax	1,284	1,700	na
Average number of dependents per full-time employee	2.34		3*3
Average annual gross earnings per agricultural worker	1,050*	1,470	1,350*4
Average hourly wage rate per farm labourer	0.44*2		na
Average annual gross earnings per general labourer	1,150*	2,400*3	2,278*5
Average hourly basic wage rate per general labourer	0.48		0.88*6

* Estimate only, excludes benefits in kind. *2 Includes basic wage adjustment but excludes all benefits in kind. *3 Male manual workers, all industries, approximate and for 1973. *4 Minimum earnings of shepherd mid-1974. *5 Male manual worker. *6 Adult male manual workers earnings, all industries for Scotland.

Source: FIG and EIU estimates.

National income per head is 10 per cent lower in the Falklands than in the United Kingdom. As pointed out earlier, however, this comparison is misleading because income from wool sales, and hence company profits, in the Falklands was so much higher than usual in 1974. The truer comparison is in terms of earnings per taxpayer, and this shows a much wider gap, even in terms of after-tax income.

UK government assistance to the Falklands community helps reduce this disparity in income per head. Indeed in 1974, UK aid of £1,677,000 amounted to £880 per head of population, but that also was an atypical figure, caused by heavy capital expenditure on the new permanent airfield. The immediate effect on average income in the Falklands was much smaller. A much more typical aid contribution by the UK was the £255,000 (in 1974 prices) in 1973, or £136 per head of population.

Although average earnings and wage rates are lower in the Falklands than in the UK and the Scottish Highlands and Islands, it is difficult to establish with certainty whether this indicates a marked gap in standards of living. Meat and accommodation are considerably cheaper in the Falklands, but imported goods are dearer and choice more restricted. The purchasing power of a £ is probably no greater in the Falklands than the UK, so that overall it would appear that material standards of living in the Falklands are distinctly lower than in the UK. But obviously comparisons of this nature are difficult to make with any degree of exactitude, and as discussed below, most Falkland Islanders appear to believe that their standard of living is not lower than that they could attain in Britain.

What is certain is that, if current trends continue, a gap in living standards must inevitably open up, with the eventual consequence being the gradual depopulation of the Falklands. Examining trends in Falkland Islands income over time, aggregate personal incomes[1] in real terms, from wages, salaries and sole trading and farming activities have declined by 11 per cent between 1965 and 1974, compared with a 9 per cent decline in

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1 From national income data.

population. The difference between these two rates of decline is too narrow to justify the conclusion that real incomes have fallen. The difference could be accounted for by changes in the composition of the work force - younger or less experienced employees, or more jobs to part-time employees on basic rates. Nevertheless, it would appear that there has been no increase in real per capita incomes. In UK, by contrast, real disposable wage and salary income rose by some 21 per cent over the same period.

Consumption patterns and the standard of living

The only quantitative information on consumption patterns in the Islands is the family expenditure "basket" on which the cost of living index is based. This was devised in 1970 on the basis of information on expenditure provided by a number of lower salary earners living in Stanley, who, in the main, also had a family. It is our view that the cost of living index may contain a number of anomalies and that it should be revised on the basis of a more widely cast and scientifically structured family expenditure survey.

Any comparisons with UK consumption patterns must therefore be heavily qualified. Table 18 shows the two sets of consumption data.

Table 18. Falkland Islands and UK Consumption Patterns - Distribution of Consumer Spending
(Percentage)

Category	F.I. 1970 cost of living index	UK aggregate consumer spending 1974
Foodstuffs	41	19
Clothing	13	9
Fuel and light	5	4
Household durable goods	5	4
Miscellaneous goods	9	16
Cars and motor cycles	-	3
Drink	5	8
Tobacco	4	4
Housing	10	13
Services	9	18
Total	100	100

Note: All figures rounded.

Source: FIG and EIU.

Comparisons of standards of living are notoriously difficult because individuals adjust to different physical environments and communities and place widely differing subjective values on the various elements which go to make up the "standard of living". There are some features, however, which differentiate the two. These are indicated below:

Features of Standard of
Living in the Falkland Islands compared with UK

- reasonably high standard of housing;
- well-fed but less varied diet with little fruit;
- less choice of material goods;
- lower average take-home pay but few expenses and more benefits in kind;
- limited range of repair and personal services;
- less opportunity for organised entertainment and recreation;
- no TV or advertising;
- less scope for travel and holidays;
- absence of pollution by noise and dirt;
- longer standard hours of work in summer months, but no urban pressures.

SAVINGS

Propensity to save

In the absence of a specific survey of personal savings habits there is no comprehensive information on the proportion of Falkland Islands' personal income that is saved. From interviews, however, it is clear that saving is a regular and widespread feature of Falkland Islands life which takes place for the following reasons:

- accumulation of funds for periodic shopping visits to Stanley (from the Camp) or abroad;
- accumulation of funds for major items of expenditure e.g. motor cycle, washing machine, Hi Fi (there are no hire purchase facilities);
- saving for future events such as children's education, passages to the UK, or elsewhere, as emigrants;
- saving for house purchase;
- saving for ill health and retirement (for Camp employees this also usually involves house purchase).

As will be apparent, some types of savings are more in the nature of deferred spending due to the lack of ready access to shops. Taking account of the isolation, the lack of opportunities for spending, the absence of unemployment and most other social security benefits,[1] the absence of banking and hire purchase facilities and the uncertainties about the future, we have formed the view that the propensity to save amongst Falkland Islanders is greater than in the UK.

An indication that saving is a widespread practice can be gained from the number of deposit accounts with the Government Savings Bank. In 1975, there were 1898 separate accounts[2] - almost as many as the total population. Of this total 775 had less than £51 on deposit and a further 377 between £51 and £200. Apart from occasional withdrawals, the Savings Bank is not used by most Islanders (particularly Camp dwellers) as a current account.

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1 In addition to pension contributions, Government spending on family allowances and charitable relief only amounted to £4,382 in 1973/1974.
2 Some accounts are in the name of Falkland Islanders who have emigrated.

Institutional means for saving

Broadly speaking, four different means of saving are available to Falkland Islanders:

1. Government Savings Bank. The Bank is the only formal savings institution in the Islands, modelled on the UK Post Office Savings Bank. Since 1973, the rate of interest payable has been 3½ per cent tax free[1] but before then was 2½ per cent. The maximum holding is limited to £20,000. Despite the tax free concession the rate of interest has been unreasonably low for the last 10 years at least, and is particularly so with rates of inflation over the last three years at around 20 per cent. Effectively, the Savings Bank has become a vehicle for taxing savers[2]. Under the Savings Bank Ordinance Government is empowered to transfer to government revenue savings bank surpluses[3], above a reserve fund level of 10 per cent of amounts due to depositors. These surpluses have arisen, mainly since 1967, as a result of differences between income earned from the Bank's investments and interest paid to depositors.

As a measure of the extent of this "tax", the sum of £573,000 has been transferred in this way over the last 10 years.

Despite these disadvantages the Savings Bank does continue to be used for both short and long-term saving. This is indicated in Table 19.

Table 19. Falkland Islands
Government Savings Bank - Types of Depositor - 1975

	£	%
Provident and benevolent funds	41,500	3
Clubs and associations	39,424	3
Farm accounts	63,292	5
Stanley business	28,974	2
Overseas	48,846	4
Sundry personal accounts	1,109,930	83
Total amount due to depositors at June 30 1975	1,331,976	100

Source: FIG.

1 This concession was introduced in 1964. 2 Referred to in the Final Report by Comben. 3 The Bank was in a deficit position on its Reserve Account from 1954/55 until 1961/62.

Although companies, clubs and one-man businesses do use the bank, the small depositor predominates.

The effect of the low rate of interest in discouraging the use of the bank can be seen from Table 20 below which shows that, with one exception from 1964/1965 to 1971/1972 withdrawals exceeded deposits.

Table 20. Savings Trends - 1965 - 1974

Year*2	Deposits	Savings Bank Withdrawals	Differences	Remittances* to UK Banks*2
1964/65	317,545	319,861	- 2,316	
1965/66	329,397	371,259	-41,862	
1966/67	339,932	350,306	-10,374	
1967/68	358,524	423,313	-64,790	
1968/69	361,245	392,482	-31,237	
1969/70	429,697	406,985	+22,712	
1970/71	394,394	428,959	-34,565	32,576
1971/72	489,470	530,543	-41,073	33,440
1972/73	540,136	538,359	+ 1,777	46,243
1973/74*3	645,790	625,540	+20,250	44,698
1974/75	842,874	811,387	+21,486	46,196

* Private remittances via FIG Treasury: no information is available for remittances via the FIC or before 1970/71. *2 For Savings Bank information the year is 1.7 to 30.6: For remittances the year is the calendar year of the last of two years in each case. *3 Interest increased from 2½% to 3½% tax free.

Moreover, the real value of total deposits has declined substantially over the last 20 years. Thus actual deposits have only increased by some 30 per cent since 1958 compared with a 160 per cent increase in the FI cost of living.

Interviews with the public indicate that the period from 1964/65 to 1971/72 was not a period of dissaving although the rate of saving declined. Thus during this period acquisition of consumer durables[1], such as washing machines and freezers, was widespread. The net withdrawal from the bank is almost certainly due to the transfer to other savings media abroad offering a better return. The level and upward trend of remittances via the FIG Treasury since 1970/1971 tends to corroborate this view. The reason for the excess of deposits over withdrawals since 1973 hardly seems justified by a 1 per cent increase in the rate of interest.

1 There is a remarkably high number of amateur radio enthusiasts there being 47 "ham" licences in 1975.

2. Employee credits in farm accounts. In the absence of any true commercial banking facilities[1], and as a result of long-standing custom, most farms[2] do not make regular payments of wages in cash. Instead the wage due accumulates on the company's books and can be drawn on by employees, as and when needed, subject to deductions for purchases from the company store and for electricity supplied. This practice means that credit accounts with farming companies represent a means by which employees hold short and medium term savings, frequently for future shopping or major purchases. No interest is payable by the companies on employee credit accounts although the companies themselves are in the practice of investing cash surpluses. Thus, to some extent the companies must therefore be augmenting their revenues by the use of employee funds.

3. "Under the bed". This method of saving is reported to occur although its extent is not known. It is probably now insignificant.

4. Overseas. Such qualitative and quantitative evidence as is available suggests that remittance of savings overseas is increasing as the gap between the Government Savings Bank rate and interest rates in UK has progressively widened. There are two means of making remittances for both of which there is a small charge. The Treasury is widely used by government employees, especially expatriate staff, and by other employees and individuals to transfer salary allotments. The Falkland Islands Company[3] will also remit funds for its employees, other companies and anyone holding an FIC current account and cheque book.

Treasury remittances are set out in Table 20. No information was available on the extent of the FIC remittances and therefore of the overall level.

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1 See Chapter 11. 2 There are only two, and recently introduced, exceptions.
3 See Chapter 11 which covers FIC's banking activities.

INVESTMENT

Comprehensive figures relating to investment in the Falkland Islands are not readily available. Moreover, it has not been possible, in the short time at the survey team's disposal, to prepare reliable data which would give an accurate overall picture of investment in the Islands. The survey team, nevertheless, has been provided with sufficient information to demonstrate that there has historically been a reluctance to invest more than the bare minimum in the Falklands, and that one of the key problems of the Islands at present is the lack of investment.

It is necessary to distinguish at this point between public and private sector investment. The Government's investment in the Falklands is mainly in the maintenance and development of infrastructural facilities (see chapters 10, 13 and 14) whereas private sector investment is largely concentrated in the primary (agricultural) sector of the economy.

Private sector investment

Since agriculture dominates the private sector in the Falklands, it is the farming enterprises which determine private sector investment. Investment in the small tertiary sector is relatively insignificant and even that is dominated by the largest of the farming enterprises - the Falkland Islands Company. There are, in total, 25 farming enterprises of which 15 are companies and 10 are partnerships or sole traders. Most of the companies are registered in the UK, but some are registered in the Falkland Islands and at least one is a Channel Islands company. The partnerships and sole traders tend to farm the smaller units whereas the companies vary greatly in size. FIC has nine separate farming units which between them comprise 46 per cent of the total area of the Falklands.

The survey team was able to visit all farms, and discussions on investment policy were held with a large number of individuals connected with them: owners, shareholders, directors, managers and employees. Against this background, an analysis was made of the final accounts of ten of the farming companies for the past five years (1970-74 inclusive)[1]. These ten companies included FIC and almost all of the larger companies which, it is estimated, represent between them at least 75 per cent of all farming

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1 Three of the companies were unable to supply their accounts for 1974 because they had not then (February 1976) been prepared.

activities in the Falklands. Because of its sheer size and importance in the economy of the Falklands, FIC will be discussed separately from the other companies. For the sake of brevity the other companies will be referred to in the ensuing paragraphs as "the Nine".

The accounts of all ten companies revealed that the only sources of funds for investment were retained profits - i.e. after-tax profits not distributed to shareholders. None of the companies had engaged in long-term borrowing to raise capital nor had they issued further shares. In the absence of fresh injections of capital of these kinds, the capital employed has tended to remain rather static.

The Nine have, on the whole, pursued a fairly conservative policy with regard to distribution of profits. In the four-year period 1970-73 they have between them distributed 59 per cent (£193,841) of their aggregate after-tax profits, thus retaining 41 per cent in their businesses[1]. FIC, on the other hand, has distributed a much higher proportion of its profits. In the 5-year period 1970-74, FIC distributed by way of dividend 96 per cent (£1,078,478) of its profits after tax. However, it must be remembered that FIC has not been an independent public company since mid-1972 when it was acquired by Dundee Perth and London Securities Limited - part of the Slater-Walker group of companies. In 1974 Dundee Perth & London Securities was acquired by Charrington, Gardner, Locket Limited, so that FIC is now a sub-subsidiary of the Charrington group. When it was an independent company FIC distributed less of its profits. For example, in the 10 years 1961-1970 it distributed, on average, 80 per cent of its post-tax profits and retained 20 per cent in the business. It should be pointed out that FIC pursues a more conservative depreciation policy than the Nine and so that, before it arrives at its profit, it sets aside relatively more for the replacement of fixed assets.

The proportion of retained profits that the Nine plough back into their farms in the Falklands is very low. In the four-year period 1970-73 the amount spent on fixed capital investment by the Nine totalled only £20,000: 6 per cent of net profits after tax and 14.4 per cent of retained profits.

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1 This, of course, is an average figure and some of the companies plough back far less. One of the Nine has retained, on average, only 20 per cent of post-tax profits in the business. The same company moreover made no provision for the depreciation of fixed assets until 1974.

The bulk of the retained profits are channelled into portfolio investments in the UK. Thus, in 1970-73 the Nine added to their portfolios investments which cost £118,628; this represented 35 per cent of their net profit before tax and 86 per cent of their retained profits. Fixed capital investment in the Falklands, meanwhile, is suffering a net depreciation. In 1970-73 the modest depreciation provisions made by the Nine exceeded their new investment in fixed assets by £15,000.

The book value of FIC's fixed capital investment in the Falklands shows a dramatic increase in 1973, when the assets were revalued. If the surplus on revaluation (amounting to £2,154,664) is disregarded, FIC's fixed capital investment also shows a decline in the 5 year period 1970-74, since the depreciation provisions totalling £163,835 exceeded the new investment of £135,516. As mentioned in the foregoing text, FIC's post-tax profits are now siphoned off to the parent company. When it was still independent, the company channelled most of its retained profits into direct and portfolio investments in the UK. Some of these direct UK investments[1] are now a substantial source of profits to the company but the bulk of its income, especially in a good year, is still derived from the Falklands.

From an examination of company accounts for earlier periods, and also as a result of the discussions referred to above, we are inclined to the view that the investment pattern described in the foregoing paragraphs is not a new phenomenon of the 1970's but, rather, the traditional pattern of investment by farming companies in the Falklands. The general policy is to keep investment in the Falklands as low as possible (without putting farm operations in jeopardy) and to channel any undistributed profits into UK investments. On the whole, the farms are decently maintained in terms of buildings, plant and equipment. Indeed there are some shining examples of imaginative investment in mechanisation and in pasture improvement. At the other end of the scale there is at least one company which, far from ploughing back profits into new investment, seems disinclined even to spend money on repairs to existing equipment or to provide decent living conditions for its managers and employees.

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1 Notably a ship's stores company and a warehousing company.

Obstacles to private sector investment

The most frequently cited obstacles to further private sector investment in the Falklands are the following.

1. Lack of investment opportunities

The companies frequently give the lack of investment opportunities as the principal reason for the low level of fresh investment in the Falklands. There clearly is some truth in this and the opportunities are not readily apparent. However, the evidence suggests that the companies themselves do not seem actively to seek out new local opportunities.

2. Political uncertainty

The political situation might well be inhibiting private investment currently but it does not explain the traditional reluctance of companies to re-invest their surplus profits in the Falklands.

3. Better investment opportunities elsewhere

The fact that higher, and possibly more reliable, returns can be obtained by investing in UK securities has, no doubt, adversely affected investment in the Falklands where the returns might not be so attractive in the short-term.

4. The capriciousness of the wool market

Fluctuating wool prices cause the profits of the Falklands farm companies to vary enormously from year to year. For example, the return on investment (net profit before tax as a percentage of capital employed) of the Nine companies referred to in the foregoing text was 0.8 per cent in 1971 while the equivalent figure in 1973 was 23 per cent.

5. The shareholding structure and control of the companies

Absentee ownership exists, in varying degrees, in most of the Falkland farming companies. Apart from the absentee owners control of most of the companies is vested in a relatively small group of people who belong to the farm-owning families in the Islands. The absentee owners, a significant proportion of whom are trustees, are mainly interested in receiving regular dividend payments. A regular income for such shareholders can be secured more readily and reliably through investment of surplus profits in UK stocks and shares rather than through longer term investment in the Falklands. The evidence indicates that local shareholders and directors are rather conservative and cling to the traditional methods of their companies. The structure of ownership and control of the companies, therefore, is not conducive to the development of bold, innovative investment policies in the Falklands.

6. Insufficient involvement of farm managers in investment decisions

Although there are now encouraging indications that the farm managers are increasingly being consulted by their boards of directors, the managers have traditionally been insufficiently involved in company decision-making. The tendency has been to treat farm managers as production supervisors rather than as general managers with responsibility for all aspects of farm operations. Surprisingly, a number of farm managers are still kept ignorant of the financial results of their companies. Even FIC has only recently begun to allow its senior farm managers access to full financial information about the farms they themselves manage. Thus handicapped, the managers, who are the most likely sources of fresh ideas, could hardly be expected to play their full part in generating new investment proposals.

7. Lack of timely financial information

There is a serious deficiency of accounting skills in the Falklands and company directors frequently have to wait an inordinately long time for their companies' financial results. While FIC and a few other companies are relatively well served with financial information, many companies have to rely for the preparation of their accounts upon local untrained company accountants/secretaries, some of whom provide poor and inadequate service.

As an indication of the delays which occur, it has already been mentioned that three of the ten companies whose accounts were examined in February 1976 were still awaiting their final accounts for 1974. In a situation in which directors and shareholders have to wait so long for annual accounts, there is little hope that the accountant/secretaries will produce other financial information and analyses on which timely investment decisions can be based.

Investment incentives

Any plan of development for the Falklands must include measures designed to encourage private sector investment. In this respect financial/fiscal inducements by Government have their part to play, but it is important to choose the right kind of incentive scheme. An attempt has already been made to encourage investment in the Falklands by the use of general fiscal measures. Following the Guillebaud Report of 1967 a supplementary profits tax was introduced (over and above the business income tax), relief from which could be obtained by taking advantage of compensating allowances available on capital investment made by the business in the Falklands in the fiscal year in question. Despite the attendant publicity, this formula proved unsuccessful in its aim of boosting investment and it was discontinued after 1973/74 on the recommendation of Comben and Waller.

Apart from the difficulty of making general fiscal measures work as investment incentives because of their alleged "remoteness from the event", there exists in the Falklands the additional complication that many of the companies are registered in the UK. The UK registered companies are able to offset the tax they pay in the Falklands against their UK tax liability on income arising in the Falklands. Hence, they are less affected by the Falkland fiscal arrangements than those which prevail in the UK. Since the capital allowances (i.e. the permissible write-off of capital investment against taxable profits) in the UK are considerably more generous than those which prevail in the Falklands at present, the latter are hardly likely to influence the UK based companies in decisions relating to their investment in the Falklands.

The current rates of capital allowances in the Falklands are shown below

Scale of Capital Allowances in the Falklands

	Initial (%)	Annual (%)
Buildings	10	2 or 4
Fencing	10	7
Jetties	10	4½
Office equipment, furniture	10	10
Plant and machinery	20	12½
Shipping	At prevailing United Kingdom rates	
Small craft (under 100 tons)	10	7½

Source: FIG Treasury.

The gap between the Falkland and UK rates (which now allow the cost of certain kinds of assets to be written off entirely in the year of acquisition) is such that immediate alignment is impracticable because of the potential revenue loss to the FIG Treasury. However, the Falkland capital allowance rates should be increased[1] so that capital investment by Falkland registered companies is, at the very least, not discouraged.

Government investment

The Falkland Government's investment expenditure is related mainly to the Islands' infrastructure. The Government capital spending programme has concentrated historically on such items as telecommunications and broadcasting equipment, school buildings and equipment, roads and tracks, aircraft, a filtration plant, a power station and a hospital. Such expenditure is met partly from Colony funds and partly from UK aid. The items which are funded by the colony itself are usually concerned with the maintenance of existing facilities whereas the larger items representing substantial improvements are normally funded by UK aid.

Thus, the construction of the permanent airfield, begun in 1974 and now nearing completion, is being financed by a grant from the UK Government. This is expected to cost £4.2 mn (but may, by completion, be £4.5 mn) and is the largest single investment ever made in the Falklands. Similarly, the Stanley power station which was built in 1971/73 at a cost of about £166,000, was also financed from UK aid mainly by means of "soft" loans.

1 We are also proposing an increase in the rate of company taxation - See Chapters 15 and 20.

In 1973/74, £50,000 of UK aid funds were earmarked for agricultural development, enabling the Falklands Government to pay subsidies totalling £48,625 to encourage fencing projects on farms throughout the islands. Investment in tourism has also been encouraged through UK aid. Tourism loans amounting to £5,747 were made in 1973/74.

Compared with the investment made from aid funds, the development expenditure met from Colony funds in recent years has been relatively small. In the 5-year period 1969/70 to 1973/74 the total amount spent on investment out of Colony funds was only £32,137. However, it should be pointed out that this does not represent all the Government's spending on capital items out of its own resources, since many such items (mainly equipment and vehicles) are, in fact, charged as ordinary expenditure and not development expenditure.

The relatively low level of development expenditure from colony funds is not due to lack of resources. At June 30, 1974 the Colony Development Fund stood at £118,999 and the Reserve Fund amounted to £102,245, making a total of £221,244.

In the past few years the Argentine Government has made two substantial investments in the Falklands. The first was a short-term investment by the provision in 1972 of a temporary airstrip at Cape Pembroke (see section on external air services, Chapter 10) and the second investment was an oil storage depot at Stanley (see section on fuel supplies, Chapter 11).

UK Exchange Control Regulations

It is widely believed by individuals who are concerned in one way or another to encourage investment in the Falkland Islands that UK exchange control regulations have been seriously inhibiting investment in the Islands by UK residents since June 23, 1972. At that date the Falklands, along with many other dependent territories, ceased to be a member of the Scheduled Territories (what remained of the Sterling Area) and became part of the new Overseas Sterling Area (OSA).

The UK exchange control rules which apply to the OSA are designed to ensure that outward investment is financed in a way which does not place an undue

burden on the UK's balance of payments. The rules distinguish between direct and portfolio investments by UK residents.

1. Direct investments are those in which the UK investor establishes or expands an enterprise overseas with the intention of participating in its management and operation. The investor must first satisfy the Bank of England of his expertise in the particular field in which he intends to invest.

Access to exchange at the official rate for direct investment is restricted to those investments which meet the "super criterion". "Super criterion" means that the project must be likely to benefit the UK balance of payments to an extent at least equal to the cost of the investment within 18 months and continue to do so thereafter. Investments which cannot meet this requirement must be financed with overseas currency borrowing or in other ways which minimise or make no demand upon the UK reserves.

Permission for direct investment is normally granted only to companies.

2. Portfolio investments are those in which the investor's interest is confined to the financial return. Such investments by UK residents must be financed from a limited pool of overseas currency known as investment currency.

Investment currency is foreign currency, originating mainly from the sale or redemption of foreign currency securities beneficially owned by residents of the Scheduled Territories which, under permission given generally or specifically by the Bank of England, residents of the Scheduled Territories may use to purchase foreign currency securities and for certain other purposes including direct investment and the purchase of property outside those territories. Investment currency normally changes hands at a premium, which accrues to the seller.

Applying these rules to the Falklands, it is clear that portfolio investments by UK residents are likely to be inhibited since a premium has to be paid for the investment currency with which they must be financed. However, portfolio investment is of considerably less significance to the Falklands than direct investment which is what the Government is seeking to encourage.

The regulations governing direct investment in the OSA are so stringent that access to exchange at the official rate is virtually impossible. The "super criterion" ensures that, with very few exceptions, the only type of direct investment that qualifies for exchange at the official rate is an export outlet for an established company. The alternative that remains for UK residents who wish to make direct investments in the Falklands, or any other territory within the OSA, is to finance the project by borrowing overseas, for example, in the Eurodollar market. This does, of course, introduce an exchange rate risk into the project, but a great deal of investment in the OSA by UK residents and companies has been financed by this means since June 1972.

In summary, it can be said that a financially sophisticated UK company wishing to invest in the Falklands is unlikely to be deterred by the UK exchange control regulations. On the other hand, an individual (perhaps a potential farmer) might well be discouraged by the need to borrow foreign currency before he can invest in the Islands. The UK companies already operating in the Falklands are, of course, unaffected by the exchange control regulations which apply only to new investment. Furthermore, there is nothing to prevent a Falkland Islander from using sterling, held on an external account, to invest in the Falklands.

Finally, it must be pointed out that the problem of attracting investment to the Falklands existed long before June 1972. However the exclusion of the Falklands from the Scheduled Territories cannot have helped the situation, and has probably exacerbated the problem.

CHAPTER 4 - MANPOWER

General situation

In 1972, the working population was 882, 45 per cent of the total population[1], as recorded in the 1972 census. 846 were in civilian employment and 36 in the Royal Marines. The activity rate in Stanley was 40 per cent and that in West and East Falkland 48 per cent and 46 per cent respectively. These rates compare with 42 per cent in the Scottish Highlands and Islands in 1971. There is said to have been no unemployment in the Falkland Islands. Since 1972, estimates by FIG indicate full-time employment, as follows:

	Stanley	Camp	Total
1972	415	411	826
1973	397	395	792
1974	409	402	811

Table 21 sets out the occupational structure of employment in the Falkland Islands in 1972 and compares it with that of Great Britain in 1971. The major differences are in the proportions of clerical workers and agricultural workers. The 1972 figures for professional, technical and related workers in Stanley are higher than those of today. In 1972, the European Space Research Organisation was still operational and included 12 scientists.

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1 Excluding 14 Argentine airforce personnel.

Table 21. Classification of Employees by Occupation, Falklands Islands 1972, Compared with Great Britain, 1971

ISCO*		Stanley		East Falklands		West Falklands		Total				Great Britain ('000)			
		M	F	M	F	M	F	M	F	Total	%	M	F	T	%
0/1	Professional, technical and related workers	70	20	6	4	6	-	82	24	106	12.0	1,719	1,068	2,787	11.1
2	Administrative and managerial workers	21	-	21	-	16	-	58	-	58	6.6	846	78	924	3.7
3	Clerical and related workers	34	38	-	1	4	1	38	40	78	8.8	1,776	2,799	4,475	17.9
4	Sales workers	21	15	2	1	-	-	23	16	39	4.4	1,183	1,064	2,247	9.0
5	Service workers	22	33	7	17	4	10	33	60	93	10.5	902	2,036	2,938	11.7
6	Agriculture, annual husbandry and forestry workers, fishermen and hunters	3	-	117	7	67	3	187	10	197	22.3	643	97	740	3.0
7/8/9	Production and related workers, transport equipment operators and labourers	155	-	48	-	72	-	275	-	275	31.2	8,299	1,708	10,007	40.0
	Workers not classifiable by occupation*2	-	-	-	-	-	-	-	-	-	-	276	375	651	2.6
	Armed forces	36	-	-	-	-	-	36	-	36	4.1	240	12	252	1.0
	Economically active	432	106	201	30	169	14	732	150	882	100.0	15,884	9,137	25,021	100.0

* International Standard Classification of Occupations (ISCO 1968). *2 Workers not classified by occupation in Great Britain, include new workers seeking employment, workers reporting occupations unidentifiable or inadequately described and workers not reporting any occupation (not unemployed).

Sources: Year Book of Labour Statistics 1975; International Labour Office; Falkland Islands Report of Census 1972.

Demand for labour

Although distinct, the labour markets in the Camp and in Stanley are by no means totally separate. Workers do move from one to the other and the supply of labour in each is influenced by the differential in total earnings between Camp and Stanley workers.

The Camp. The demand for labour on the sheep farms is a function of two main factors, namely the desired manning level and the extent of labour turnover. The general policy on farms has been to man to meet maximum labour requirements, albeit spreading the peak shearing activity over as long a period as possible and deferring all leave and most maintenance and investment (e.g. fencing) activities until the slack winter period. This policy has its roots in poor communications between settlements and the need, for social reasons, to maintain a stable community. Since the second World War there has been a gradual reduction in shepherding activities, largely because of the increase in wages relative to wool prices. This situation has also encouraged fencing and greater mechanisation, all of which have contributed to the decline of Camp employment by 16 per cent from 1966 to 1975.

Events of the last few years - the advent of contract sheep shearing[1], an increase in labour turnover (taking the Camp as a whole) and difficulties in recruiting replacements - are causing some farms to revise their policy with regard to manning levels. This particularly applies to larger farms where the social effects of reducing the overall size of the community are less serious, or can be counterbalanced by bringing outside shepherds into the main settlements. Thus some farm managers intend to operate with much smaller gangs in future, perhaps 60 per cent of previous levels, relying on contract shearing to meet peak demand. At a few farms, the reduction has already begun in the face of difficulties in replacing vacant posts. These have been caused mainly by Johnston Construction, early in 1975, entering an already tight labour market, with a need for 70 locally-recruited employees to work on the permanent airfield contract.

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1 Two gangs now operate.

Some measure of the extent of demand for labour is provided by the number of advertisements over the radio[1]. Thus, in 1975, 50-55 jobs (about 13 per cent of total camp employment) were advertised on 70 separate occasions. Moreover, in the light of the situation described above, some farms were deliberately refraining from filling vacancies.

The pattern of demand seems to vary considerably from settlement to settlement. In some, there is a marked stability in the labour force and in others a high labour turnover. Farms in the latter category, tend to be the larger settlements or those near to Stanley. Here there is a growing sense of transience on the part of the workforce. Apart from the social effects, this is discouraging management from training young employees and newcomers.

Stanley. The two main employers are the Government and FIC, over one third and over one quarter respectively, although Johnston Construction Ltd was the biggest employer of new labour in 1975. The policy of both is to recruit locally wherever possible but the lack of tertiary education on the Islands does mean going abroad for senior management and professional and some technical staff. In 1975, between 40 and 45 jobs were advertised on 70 separate occasions. Almost all were with Government[2], Johnston Construction being able to meet their needs by direct recruitment. Labour turnover in Government appointments appears to have been moderate over the last five years, at some 20 per cent per annum. FIC used informal means of recruitment. Their generally low rate of turnover is highest in their retailing activities.

Labour supply

There are three main sources of supply for jobs in the Islands.

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1 All vacancies must be advertised locally on three separate occasions before they can be advertised overseas. 2 In fact some of the vacancies were due to employees leaving for Johnston.

School leavers. 25 to 30 school leavers join the work force every year. There is no formal post-school training on the Islands and therefore school leavers generally enter employment straight from school at the age of fifteen. In camp, boys take up jobs as labourers, shepherds in training, wool boys or apprentices and receive on-the-job training. For girls there is only domestic service and the occasional land girl vacancy. In Stanley, the most common openings for boys are as apprentices, labourers, clerks and messengers and for girls as nurses, shop assistants, clerks, typists, telephone operators or domestic servants. Again, training is provided on the job. Some Islanders follow correspondence courses and many are self-taught. A few who complete secondary schooling abroad return and take up positions with management prospects such as farm cadet.

Immigrants. Immigrant workers are brought in[1] when local labour is not available. Government and the FIC are the main importers, relying mainly on advertisement overseas, but occasionally on personal contact. In total, approximately one-third of the work force comes into this category. Over four-fifths of the immigrant workers come from UK. The other countries of origin are Chile, Ireland, New Zealand, Australia and USA. Broadly speaking, there are two categories of immigrants, the professional or skilled worker in the absence of Island residents with the requisite qualifications and experience, and unskilled or semi-skilled workers for farm jobs in the absence of Islanders to fill vacancies (largely because of high levels of emigration). The proportion of immigrant workers in the labour force is higher in West Falkland and in Stanley than in East Falkland. Most government contracts specify a fixed term of employment covering one or more tours of service with paid return passages (see below under OSAS). Senior positions with FIC involve similar terms, but on FIC farms the practice is now to offer only a paid outward passage to the Islands. This means that immigrant workers must either intend to settle or save up for a return passage. In general, immigrant workers seem to have been of mixed quality, many being adequate or becoming so, but others having definite short-comings. Wastage seems to have been quite high, particularly in the first two years after appointment. Thus, taking recruits on FIC farms for 3 years in the 1970s, just over one-third had left by the end of the second year after arrival. Married employees tend

1 There have a been few cases recently of people from UK taking the initiative and expressing an interest in emigrating to the Islands if jobs could be offered; as yet there have been no such offers from any employer.

to be more stable than those who are single. A number of factors have contributed to this situation including:

- recruitment of men with an urban rather than rural background;
- lack of adequate briefing about the Islands;
- use of unsuitable media for advertising vacancies;
- weak induction and training procedures on arrival.

Other jobs. No quantitative information is available about the extent of this source. There is an informal understanding among farm employers to avoid conscious poaching. Thus FIC, in Stanley, refuse to take on any employee directly from the camp[1]. Nevertheless the movement between jobs is not insignificant. The recent experience of Johnstons Construction[2] is illuminating. Of approximately 70 locally-recruited employees, 13 were previously employed in the Camp, 12 with Government, and 8 came straight from school. Movement from FIC was negligible mainly because the jetty gang, the main potential source, is well paid. Members have opportunities of piece work and good long-term prospects of relatively high earnings.

Since work on the airport should cease in 1976, the attitude of the Johnston workforce is relevant to the future supply of labour. Selective interviews suggest that:

- none would want to enrol on farms;
- most would hope for similar employment, in terms of work and skills, in Stanley, but were worried about the future because of the political uncertainty;
- most of those under 30 had saved enough to leave the Islands.

Shortage of labour. It is widely believed that a serious labour shortage exists on the Islands.

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1 Employees have to resign before their application can be considered. 2 In fact just under half the local labour at the airport is supplied by two Islanders on contract to Johnston Construction.

In common with others[1], we consider that the absence of unemployment and existence of many part-time jobs are not, of themselves, proof of such shortage. As mentioned earlier, the latter in particular is more a feature of a market too small to permit the successful operation of an activity on a full-time basis; such multiple job holding is common in many island economies. Factors which argue against the shortage theory are the maintenance of relatively high manning scales on many sheep farms (often for sound social reasons) and the low proportion of women in employment. In 1972, the latter was 21 per cent in Stanley, 14 per cent in E. Falkland and only 9 per cent in W. Falkland, but it has certainly risen somewhat both in Stanley and in Camp since then. Moreover, construction of the airport, involving a workforce amounting to almost 10 per cent of the Island total, has been accommodated without serious disruption to the economy. Some farms have lost labour but not below levels which have been justified economically for some time. In Stanley, the activities of PWD have been cut back, the lack of road maintenance being the most noticeable effect. Although the labour market has been finely balanced for some time, we conclude that a true shortage only emerged in 1975 and that this in all probability, is only a temporary one.

Overseas service aid scheme (OSAS). Just over half the senior civil servants on the Islands and many in middle grades, are expatriates[2] receiving salary supplements, paid by the UK government, over and above the basic FIG salary and cost of living allowance. By definition the scheme is not open to Islanders. The UK government also pays return passages for the officer and his dependents. Falkland Islanders holding similar positions receive only the basic salary and Cost of Living Allowance (COLA) plus (usually) a leave entitlement to the UK. The Overseas Service Aid Scheme, whilst providing for the current needs of the Islands for professional staff by bringing salaries up to market levels, does so only at the expense of a permanent "brain drain". This problem is not unique to the Falklands but tends to apply to all territories which are too small to provide higher education and training. Many Islanders who have emigrated (see Chapter 2) have gone for educational reasons. Having obtained qualifications and an appropriate job, they can only return to the Islands if they are willing to

1 For example "Labour, Industrial Relations and incomes in the Falkland Islands" by S. McDowall 1974. 2 14 out of 26 in Grades 3 and above with a further 8 in middle grades, mainly teachers and nurses.

take an absolute cut in salary and tolerate working alongside similarly qualified expatriates receiving higher pay. Indeed, in the Falklands today, should an Islander working abroad apply for a job, for example, as teacher or nurse, he or she would not be entitled even to a return passage[1]. A further adverse effect stemming from OSAS, as it operates, is the degree of general resentment on the part of Islanders, particularly in the civil service, at the higher salaries coupled with the relative youth and inexperience of many of the expatriate officers. It is to be noted that had the Falkland Islands Government operated a scheme for assisting higher education and training of Islanders in the past, the degree of dependence on expatriates would almost certainly have been less today.

Wages and salaries and cost of living allowances

Payments' systems in the Islands incorporate two main features, namely an automatic adjustment to the cost of living and, wherever possible, the use of payments by results, applicable when employees "go on contract". Wages and salaries paid are determined, or indirectly influenced, by one of four main types of agreement, each of which is considered below.

Stanley Wages Agreement. This Agreement runs annually from January 1 and is negotiated by the Government and FIC with the General Employees Union (GEU). It applies to hourly paid employees in Stanley. Under the Agreement, wages comprise the following main elements:

1. Basic minimum wage, varying with the class of employee.
2. Extra payments for unpleasant or hazardous work.
3. Overtime rate.
4. Cost-of-living adjustment added to the basic wage. This is a four-quarter moving average of the cost-of-living index resulting in an award of x pence per hour for each point increase. The same absolute cash sum is awarded to all employees regardless of grade; so reducing skill differentials.

One exception to the time rate basis for wage payment applies to the FIC's jetty gang who work "on contract" when a ship is being loaded and unloaded and receive piece-rate payments linked to the tonnage handled. In practice, this increases earnings by about 50 per cent above the basic wage.

1 Although this is the general policy, the government would consider exceptions.

Camp Wage Agreement. This Agreement also runs annually, but from October 1, and is negotiated by the Sheep Owners Association (SOA) and the GEU. It applies to all employees other than managers. It is a complex Agreement, the main wage elements of which comprise:

1. Basic minimum monthly wage, varying with the class of employee.
2. Piece-rates for various "contract" activities, such as shearing fencing, peat-cutting and ditching.
3. Extra payments.
4. Overtime rates.
5. Cost of living adjustment as for Stanley employees but based on the COL index adjusted for the Camp.
6. Basic Wage Adjustment (BWA) which varies with the average Colony wool price.
7. Long-service awards[1].

The unusual feature of the Agreement is the Basic Wage Adjustment (BWA). This is a form of general prosperity bonus which comes into operation when the average wool price exceeds an agreed level, in 1975 53p per kilo. It can constitute over one third of gross earnings. It can not be regarded as a form of profit-sharing because it is payable irrespective of the profitability of the farm company. There is, therefore, no link between effort and productivity on a particular farm, and the adjustment. Moreover, the amount payable depends on the price paid for wool shipped 6-9 months before the commencement of a current Agreement. Its unpredictability, which must have adverse effects for both employees and management, makes budgeting of farm costs very difficult. Previous reports by Theophilus (1972) and McDowall (1974) have drawn attention to the complicated nature of the Camp Wage Agreement and, in particular, to the heavy dependence on piece-work rates for many types of work. We take the view that for many activities, like peat-cutting, fencing and ditching, piece-rates are an appropriate form of payment in that such tasks are carried out without supervision, often in unpleasant weather conditions, and are hard work. But some simplification of the present arrangements would facilitate understanding between labour and management, would make wage costs more predictable and would reduce accounting costs. Discussions were held between the SOA and GEU, following McDowall's recommendations, as a part of the wage negotiations for 1975. There had been no prior preparation of the

1 Most farms also operate a provident fund.

grounds by informal discussion and the SOA's suggestions were rejected by the GEU.

Government Salary Scales. These are reviewed periodically by an independent salaries' commissioner and put into effect after the government has accepted all or part of the commissioner's recommendations. The last such review was carried out by Mr Sedgwick in 1972. Local employees can take up either permanent and pensionable appointments (after a period of probation) or contract appointments. The former type of appointment involves an overseas leave entitlement, but, for appointments since 1973, only passages to Buenos Aires are paid. This reduction in terms was, and continues to be, greatly resented. Contract terms, which include a gratuity, have been more common in recent years. They offer young Islanders the greater career flexibility and, at the same time, the valued paid family passages to the UK. As with the other two agreements, salaries are adjusted in accordance with movements in the cost-of-living index, but the adjustment does not count for pension purposes until after consolidation at the next revision[1].

Cost-of-living adjustment. There is no doubt that, in the 27 years of its operation, the automatic adjustment of wages and salaries to the cost of living has contributed towards industrial peace. It is a highly-regarded means of protecting most of the population from the effects of price inflation, which is very largely imported. It has, however, had the subsidiary effect of substantially reducing skills differentials, possibly to an extent where there is insufficient monetary inducement to acquire a skill. On farms there are now frequent complaints about the difficulty of recruiting shepherds, but this is not surprising, since the differential has fallen from one third of a labourer's basic rate in 1966 to 17 per cent in 1975.

1 This can be inequitable and a source of hardship in times of rapid inflation or when there are long gaps between revisions.

The index itself, which would be described more correctly as a retail price index, suffers from a number of defects, most of which can be attributed to the fact that the weights of the index have not been recalculated since 1970. The main defects are:

- it is based on an unrepresentative family expenditure survey;
- quarterly measurements are based on prices in one shop only, and there is no averaging;
- the basket excludes a number of relevant items, such as purchase of motor vehicles, and includes some others which are no longer obtainable in the form specified;
- there is no weighting within Groups 4 to 9 for individual items, despite the fact that these account for 40 per cent of total spending.

Patterns of consumption are likely to have changed since 1970, and the weights should be revised at annual intervals.

Employee and employer organisations

The Stanley and Camp wage agreements are negotiated annually between the Falkland Islands General Employees Union and the Government and Falkland Islands Company for Stanley, and the Sheep Owner's Association for the Camp. The lack of disputes[1] characterises industrial relations in the Islands, which have been conducted in a spirit of reasonableness and moderation rather than confrontation. The natures and roles of the General Employees Union and of the Civil Servants Association and the newly-formed Association of Farm Management, which do not have negotiating rights, are described briefly below.

General Employees Union (GEU). The GEU, which was formed in 1943, is the only registered union on the Islands. Membership is open to all hourly-paid workers both in Camp and Stanley, but has not, in practice, included skilled craftsmen working in Stanley. The number of members in 1975 was 442, having risen from 402 in 1972 following a steady decline from 545 ten years earlier.

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1 About three over the last 30 years.

Membership levels are high covering over three quarters of the potential membership.

Organisationally, the Union structure comprises a network of elected delegates, who represent membership at each Camp settlement and major place of work in Stanley, and a 12 man committee. The annual membership subscription totalled £6 from 1970-74 and is now £10. Given the number of members, this provides the union with very limited finances, most of which are devoted to the salary of the full-time General Secretary, the Union's only employee.

The Union has concentrated on its wage-negotiating role to the exclusion of any overt political or social goals. In its chosen field there is much evidence to suggest that the members have been well served. Nevertheless, the Union does have a number of problems, namely:

1. The difficulty of regular and effective communications between the General Secretary and members in the Camp due to problems of distance and inadequate funds for travelling of delegates or the General Secretary. This factor no doubt contributed to the unofficial stoppage, at the end of 1975, which the Union eventually had to back, over the higher rate of increase incorporated in the Camp Agreement for shepherds' wages compared with others.

2. The existence of two groups of members, those in Stanley and those in Camp, whose wages are determined by two separate agreements negotiated at separate times, is a source of potential tension, if not conflict, as there is the possibility of a serious divergence in their earnings.

3. The weak financial position of the Union (no doubt the Union is the best judge as to what subscriptions its membership will bear) severely limits Union activities and poses problems for its future. Unless and until diversification of the economy increases employment, the only scope for expanding membership is through widening the Union's coverage to include skilled workers and possibly civil servants. But the inclusion of either could create problems of divergent interests within the membership. It can be argued that the level of work does not justify a full-time General Secretary. While this may be true in a narrow sense, the present appointee sits on numerous committees and also holds other unsalaried

posts. This would hardly be feasible on a part-time salary: yet the presence of a Union voice in public affairs is of value to the community as a whole. Moreover, as long as there is no scope for cost cutting, there is a serious problem of succession, since the Union, at present, can clearly not afford even a part-time assistant to understudy and eventually take-over from the present General Secretary.

4. The extensive public responsibilities of the present General Secretary, coupled with the lack of funds for travel, must militate against the task of keeping in touch with members' views and grievances.

Sheep Owners' Association (SOA). The SOA was originally formed as a voluntary association, with wage negotiation its main function. Negotiations take place annually during July. It has gradually developed the trade association side of its activities, although to no great extent. However, it recently reconstituted itself as a company limited by guarantee to facilitate expansion of this side of its activities, and in particular to enable the establishment of a Falklands wool trade mark[1]. Compared with the Association of Farm Management it concentrates more on the current health and running of the industry rather than its future advancement.

Its membership covers all but one farm, fees being based on a flat rate charge plus a supplement per 1,000 sheep. It employs a part-time secretary and has recently acquired premises in Stanley which are of particular value for periodic meetings and its annual conference in July. No links with any international organisation connected with the wool or sheep farming industry have yet been established.

Civil Servants Association (CSA). The Association, representing the interests of Falkland Islands civil servants, is constituted under Colonial Regulations. It lacks any negotiating status and is, therefore, not a civil service union. Moreover, there is no formal forum in which there could be consultation over matters pertaining to conditions of service. The normal

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1 This has not yet taken place.

procedure for raising grievances is to write letters or send deputations to the Chief Secretary. The Association has no links with any UK civil service union or with the GEU.

The Association suffers from a further weakness in that membership is, in effect, limited to civil servants who are Falkland Islanders, although it seems to be well supported. This follows the introduction of OSAS salary supplements for expatriate civil servants which led to diverging interests, particularly over the central issues of final salary and passages, and a break away of the expatriates who formed their own Association. Since expatriates hold many of the most senior posts, the CSA is now more of a junior/middle grade association and, in raising issues with government, must deal with people between whom the bonds of common interest are lacking.

Falklands Island Association of Farm Management. This organisation, now about to become a company limited by guarantee, was formed in 1975 with two main purposes: firstly, to act as a pressure group for maintaining and enhancing members' conditions of service, and, secondly, to act as a forum for the discussion, consideration and dissemination of information about matters of professional interest related to the advancement of the agricultural industry. Its first activities, which were directed towards raising members' salaries, are reported to have been successful. The Association now has about 88 per cent of managers in membership and is also open to farm accountants on an associate member basis. Whilst there is clearly some degree of overlap with the SOA, particularly in the subject matters considered, there is a difference of interest over conditions of service. Moreover, the early indications are that the Association may be somewhat more responsive to change and open to innovation. The Association is now preparing a code of professional ethics and developing a system of financial statistics for the comparative measurement of farm performance.

CHAPTER 5 - SOCIAL ASPECTS

SOCIETY

It is not of course possible to speak with authority on this subject after a bare month in the Falkland Islands. However, the following observations and discussion reflect broadly the views of the whole team, who between them visited virtually all the settlements, and spoke to several hundred people individually or in small groups.

Certain matters of fact can be usefully stated at the outset:

1. The Falkland Islands have been continuously settled for less than 150 years. Though the great majority of immigrants have come from the UK, they have come mainly as individuals or in very small groups, rather than as large bodies of people from their original communities (as, for instance, happened in Canada in the case of Scottish Highlanders).

2. The present Islanders trace their antecedents to a wide variety of places in the UK (though Scotland and the south of England appear to predominate).

3. On arrival, the majority of immigrants moved into widely dispersed and very small settlements with relatively little inter-communication.

Thus, the Islanders came with relatively little in common, and have had scant opportunity to establish a distinctive Falkland Islands culture. Such cultural features as are very readily apparent reflect a strong, even fierce, awareness of British origins. There is little in the way of obviously local characteristics to compare with the customs, tradition and language of many island communities more anciently settled.

This is not of course to suggest that there is no system of shared beliefs and values among Falkland Islanders[1]. However, even at a superficial level it has to be recognised that there are several important groups among the

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1 So far as is known there has been no study in depth of social and cultural features in the Falkland Islands, nor of course was such a study possible in the time available to the team.

Islands' population. One is the land-owning and managerial class, another is the body of farm workers in the Camp, and yet another is composed of the inhabitants of Stanley. Each of these groups may be further divided into indigenous population (the locally-born 'Kelpers') on the one hand, and, on the other, those who have come in their lifetime from outside (almost exclusively from the UK and usually on contract).

These distinctions are often invoked within the Islands. Apart from some landowners and managers, common cause is frequently made between native-born people in Stanley and in the Camp - and it is among this broad indigenous group that values crucial to the social and economic development of the Islands must be sought and if necessary stimulated. In terms of development potential, these locally born people have been described to the team as possessing a number of important qualities, which we can confirm from our own experience. They include honesty, versatility, physical hardiness, and a capacity for sustained effort. Yet there appear to be other less encouraging features, such as a lack of confidence and enterprise at the individual and the community level, and a degree of acceptance of their situation which verges on apathy.

It is not easy to demonstrate the existence of these latter characteristics, which are mostly negative in their effect. However, they have been remarked on to the Team by several of the Islanders themselves. Team members have also inferred their existence from interviews with many local people who have responded even more cautiously to ideas on social and economic development than might have been expected of them in their marginal situation.

More specifically, these features seem to show in the reluctance to undertake the several small commercial projects which appear feasible in the Islands. There is also a tendency to leave social action (e.g. in welfare and leisure associations) to non-local people. Politically too, there seems to be a degree of inertia. Such attempts as there have been to rally opinion on local issues have not had much popular response. We heard strong if resigned comment on the disbandment some years ago of Stanley Town Council, one of the very few potential counterweights to government,

yet at the time of its abolition, there seems to have been little local resistance. The National Progressive Party, an interesting and relatively moderate group concerned about local affairs, had only a brief life in the 1960s. In recent memory no farm worker appears to have sat on the Legislative or Executive Councils.

These features, if accurately reported, do not promise a dynamic future, and it seems very important to identify and treat their causes. They are, of course, found in many other marginal rural situations - in some parts of the Highlands and Islands, for instance, especially up to a decade ago. The cause in such situations has commonly been acute depopulation over more than a century, depriving the community of its most vigorous people. Yet while population loss in the Falkland Islands has been marked, though not so longstanding as in northern Scotland, we have thought it likely that it is as much an effect as a cause of social malaise.

Various other causes suggest themselves. Physical features such as the settlement pattern and poor communications obviously play their part. Some local people are inclined to blame insecurity caused by the sovereignty dispute, and this is certainly a very significant factor, for instance in reluctance to invest money in local enterprises, economic or social. Yet, in the Team's view the causes relate more to internal features - in particular to the structure of society and the quality of life.

The Camp

The most striking feature of the situation in the Camp is the dependence of the people on the companies and the resident owners or managers. Camp workers receive free housing, fuel, milk and meat. They obtain other provisions at the company's store which is usually open for a few hours each week. At nearly all farms the arrangement is that the cost of goods is deducted from their wages, a situation which is said to be acceptable to them. The management in fact handle most financial matters for their workers, including tax returns. One manager, who dislikes this arrangement, told us of men having up to £2,000 standing to their names in the Company's books - money which he felt should have been invested elsewhere at a good

return, though in fact the workers involved were said to show little concern themselves. Communications are also often of necessity in the hands of the manager or owner. Though some settlements, particularly on West Falkland, have telephone links with each other (and in East Falkland some are connected with Stanley), it is common for "the big house" to have the only voice contact with the outside world (usually by radio telephone). In these cases the farm workers must approach the manager or owner in any situation, however personal, requiring early action from beyond the settlement, e.g. in regard to medical advice.

A feature of dependence of this kind is that it is not always recognised by those concerned, and it would not yet be true to speak of total dissatisfaction with the situation in the Falkland Islands. In most cases there is a good relationship between managers/owners and workers. Some managers/owners are genuinely concerned about the dependency pattern. Their employees, whose interests are the concern of a trade union, are usually prepared to acknowledge the immediate material benefits of their situation. Housing is of a relatively high standard for married workers; working conditions are generally much better than some years ago; and it is possible to save a certain amount for retirement. Many other workers are content with their lot for much of the time, and comment appreciatively on the open-air life, relaxed pace of living, the suitability for younger children, and the undoubted beauty of most of the settlements (which are, after all, their homes). However, it is undoubtedly a highly dependent existence and although workers move from time to time to other Camp settlements (easier today in view of the labour shortage), this is to go from one dependent situation to another.

Although the attitude of most managers/owners is certainly benevolent, it may also be described as paternalistic. (Indeed, more than one manager told us that it might sometimes appear feudal.) Of course dependence and paternalism are to be found - often with fewer material benefits - on estates and large farms in the United Kingdom; but workers there have usually a much wider range of alternatives. There are signs that some Camp workers -certainly the younger ones - are looking critically at their situation. A strike over pay a little over a year ago, though widely seen as doomed to failure, was in fact sustained. We spoke to several young men

in Stanley (including locally born Islanders) who said that they had left the Camp in search of a greater degree of personal freedom. They felt strongly, too, the fact that there is no real prospect of career advancement in the Camp. These attitudes are significant in the pattern of out-migration of young people from the islands, and also in the movement from the Camp to employment on the construction of the new airfield.

We also heard dissatisfaction expressed by some older workers in the Camp. Their concern tended to be less with their relationship with managers and owners than with opportunity to gain a stake in the Falkland Islands. Young and old alike, in fact, told us that they wanted to see land made available to 'ordinary people' like themselves. However, those older persons who spoke to us in these terms were said to be less inclined to move, because they had to consider the effect on their pensions and the fact that if they moved to Stanley they would not have saved sufficient to buy a house (most of them being married).

The vacating of houses in the Camp on completion of householders' working lives (usually soon after the age of 60) is an important social fact. Not only can older people provide continuity and the reinforcement of values in a community; they may also be of political importance. In island situations in Scotland, for instance, vigorous men and women in their sixties continue to give much to their home communities, e.g. through local government, being usually secure both financially and in the ownership or tenancy of a house.

In the Falklands a Camp worker of 60 or so finds himself entering a new phase of dependence in a strange environment. His savings must be spent in purchase of a house in Stanley, and he is commonly left with barely enough to subsist during his remaining years. He may well have to seek work on a full or part-time basis. Some older people find the change from the Camp to Stanley almost overwhelming, and we found examples of this. Departure from the Camp is not simply the loss of friends and family (though in fact children not infrequently follow their parents to Stanley), but is a total change of environment. The Camp and Stanley are very different places, and although there is concern to improve understanding between the two, awareness of different life-styles remains. These are not confined to

superficial differences like the one hour variation from Stanley time maintained by many settlements, but are a matter of an urban as opposed to a rural community, and of service providers as opposed to primary producers.

Another factor may be mentioned here which affects the cohesion of Camp society and cultural development. This is the necessity for companies to recruit a proportion of farm labour on contract from the UK. Some of these workers have settled permanently in the islands, but many leave within a few years. Many make a useful contribution to local life, but others seem to become quickly disaffected and have an unsettling effect on the community. Whatever their adaptability, it seems unlikely that any but those who intend to settle permanently will have a commitment to the local community to match that of indigenous people. Thus, a proportion of the population in Camp has no long-term interest in the islands and under the present arrangements cannot be regarded as having significant development potential. Moreover, by no means all contract personnel come with families, and the importation and communal housing of mostly young unattached men produce further divergence from the more usual structure of rural communities in British society - another being the absence of the elderly.

Recreation in the Camp is discussed in Chapter 13, where the very variable and often inadequate pattern of activity and provision is described. Mention is made of the impact of isolation and lack of stimulus, particularly on women. These effects differ from settlement to settlement of course, often depending on size of population and degree of remoteness (the extraordinary dearth of women in West Falkland is significant here). They are presumably accentuated in those very small communities (commonly no more than half a dozen households and a bunk-house) where neighbourliness has to be measured against the need to maintain a degree of privacy - especially where not all of one's neighbours have a long-term commitment to the community.

Factors of this kind may account for the impression which some of us gained of a less extensive social life within many settlements than is found in other small rural communities known to us. Indeed if such considerations are taken together with the pattern of dependence, the lack of opportunity,

the low education level, and the imbalanced structure of the population in age, sex and marital status, it is difficult to escape the conclusion that the quality of life is distinctly low in at least some parts of the Camp.

Stanley

Life for the inhabitants of Stanley is in many cases hardly less dependent than in the Camp. With two concerns (the Falkland Islands Company and the Falkland Islands Government) employing over two thirds of all workers (until the start of the airfield in 1974) there is little choice of employers. There is no unemployment benefit. Moreover, subtly embracing all aspects of life is the impression of dependence which results from being an island community some 7,500 miles from the motherland (an impression heightened, it must be said, by the Argentinian claim and the concern this has caused among the Islanders). Virtually all goods are brought in from Britain, and there are only four arrivals per year of the cargo ship (on charter to a subsidiary of the Falkland Islands Company). The air service to and from the Islands is controlled by the Argentine. The Falkland Islands Government has to assume more responsibility than would be expected in a metropolitan situation, and in fact operates most services, from internal air transport to funeral undertaking.[1] Until quite recently most Government services were in the charge of contract personnel from the UK. In recent years there has been some recruitment of local staff for senior positions, but there is a long way to go in this yet; and it is a fact that those Islanders who have been appointed to senior posts receive much less in salary and benefits than their counterparts from Britain (see under OSAS, Chapter 3).

Reference has been made above to some of the main groupings in Falkland Islands society. In Stanley the situation is more complex than in the Camp and various sub-divisions and separate groups are apparent which bear on the pattern of social life. Personnel on short term contract from the UK, e.g. those working in government, have already been identified as a group. They tend to have relatively little in common with the Islanders, though

1 Some of the functions exercised by public servants would elsewhere be the province of independent entrepreneurs who could act more freely in local affairs.

some have overcome local diffidence very successfully. There is also a somewhat separate body composed of senior staff in government and business and certain retired people (e.g. from farm ownership and management). Another group is composed of elderly farm workers who have had to leave Camp on reaching their 60's. Also from Camp are young single men and women who have come to Stanley in search of work, a change of scene, and greater independence. These young people commonly stay with relatives retired from Camp, and for some Stanley is merely a stepping-stone to further migration. Yet another group at present is the labour force brought in - mostly from the UK - by the construction company building the airfield.

For a community of about 1,000, then, Stanley's inhabitants have a remarkably wide range of backgrounds, levels of commitment, and durations of stay. It is not surprising that those who are born and remain there are known for a certain polite reserve. The groupings referred to are not of course rigidly separate, and there is frequently contact, sometimes to the extent of concerted community reaction and involvement - though not very markedly as a rule. Undoubtedly the most striking example of solidarity has been the common feeling on the sovereignty issue. (The recently formed Stanley branch of the Falkland Islands Committee, which has been active on this issue and other fronts, has a quite broadly based membership in the town.) However, at the level of informal social life distinctions do seem to be tacitly observed. Indeed the situation as regards community spirit and cohesion was perhaps well put to us by one resident when he said simply "There is no glue".

Of course there is nothing reprehensible in people of like backgrounds interacting in groups. The concept of total community can be naively invoked. But difficulty can arise when separation and stratification exist to this extent in a very small community in need of economic and social development. It may not be easy to produce the confidence, common identity and wide response which are crucial to success in these fields.

Dependence

Various factors, then, have been suggested as causes of the relatively low level of enterprise and engagement of the indigenous population. As

already stated we acknowledge the part played by obvious problems such as the physical remoteness of the Islands and the sovereignty dispute. We are inclined, however, to see the prime causes as related more to underlying internal features. If pressed to identify the most important of these features we would suggest that it is the continuing history of dependence of the great majority of Falkland Islanders. Whether in Camp or in Stanley, most native born islanders of what they themselves call "the working class" live in conditions of dependence, which are attractive in immediate and material terms, but which offer no encouragement for engagement in economic, social or political development, since scarcely any of them have a stake in the place. Few have had much part in the ordering of their affairs. This applies as much at the collective as at the individual level. Apart from the right to vote for the small group of people who make up the Legislative Council (dominated, at least numerically, by farm owners and managers) they have no real opportunity to influence decisions on public affairs. As has been mentioned, Stanley Town Council was abolished a few years ago, and there is no other counterweight to central government - nor training ground for Exco/Legco membership. Yet there seems to have been no significant local political movement since the attempt to start a party in the 1960s.

Accentuating this pattern and its effect on confidence is the fact that there seems to be little recognition, at official or other level, of the need to foster local identity. It is clear that the distinctly low education standards in the Islands leave locally taught people at a disadvantage in dealing with farm managers/owners and UK recruited persons, heightening the sense of dependence and relative inferiority. However, there is more to the problem than a difference in basic educational skills. To date the teaching of these skills has been so pressing a need, in view of inadequate resources, that little attention has been given to introducing Falkland Island themes and topics into the curriculum, and thus helping to validate local identity and strengthen confidence. This issue is further referred to in Chapter 13 under Education.

WELFARE

There was no paid social worker in the Falkland Islands before January 1976, when one arrived from Britain under the VSO scheme. In the short period of her contract (one year, possibly extending to two), it is not expected that she will be able to do much more than identify needs and priorities.

As discussed below, the Team's impression is that there is a need for action in most, if not all of the conventional social work fields, although such work should complement voluntary action and neighbourliness rather than replace them.

Care of the elderly. We have already referred to the situation of many older people in Stanley, separated on retirement from family and friends in Camp and often short of money. Thus the needs of the elderly appear to require close monitoring. The Churches and organisations like the Red Cross and Corona Societies do as much as they can at voluntary level (in the way of visiting, parties and outings, etc), but systematic professional support is also needed. Old people are of course often unwilling to take what they regard as charity, but in the UK publicly financed services like meals-on-wheels and home help are now widely accepted. Cases of more acute geriatric need requiring residential care are admitted to hospital (see under Medical Services, Chapter 14). However, as is acknowledged by the Senior Medical Officer, it is difficult to provide old people in these circumstances with the special kind of attention that they need. There is no old people's home in Stanley, nor any sheltered housing.

Family problems. As has already been stated, a remarkably large number of marriages in the Falkland Islands end in divorce (see Chapter 2). Causes probably include early age on marriage, imbalanced sex ratio, isolation and boredom (see Chapter 14 under Recreation) and lack of guidance. Apart from action which could be taken in regard to some of these causes, there is room for social work to relieve the effects - notably on the children involved. However, one clergyman told us that there are fewer obvious signs of distress than might be expected.

Nonetheless there are several 'problem families' - although probably no more than would be likely to occur in a broadly comparable community in the UK -who need professional attention. Not all their difficulties arise from divorce. Drink, mental handicap, budgetary mismanagement etc are also involved, as they would be anywhere else. At present the machinery for dealing with such cases is inadequate, though as much as possible is done through the Churches and 'charitable relief'[1].

Delinquency. It appears that convictions for crimes and offences occurring in the islands have fallen appreciably in number in the past few years (53 in 1969; 30 in 1974). The most recent figures show almost half the cases as concerned with road traffic. Of all offences a large proportion are said to be committed by persons from visiting ships. However, the police report a considerable increase in juvenile delinquency in the past two or three years, which is said not to be reflected in the figures, as in the case of children charges are preferred only as a last resort. The juveniles concerned are largely from problem families in Stanley, and this would seem to reinforce the case for a social worker.

A problem is also reported in regard to a few very young girls (aged 12-14) unsupervised late at night in Stanley.

It should be added that the police appear to have a staffing problem, with effectively only two experienced fulltime officers available at the time of the team's visit (a sergeant had just resigned). At present, in addition to their more conventional duties they supervise the gaol and act to an appreciable extent as unofficial social workers. There are said to be difficulties in recruitment and training.

Alcoholism. Drinking is widely reported as a serious problem in the Falkland Islands. It was said for example that a good deal of drunkenness occurs at dances, and that it is customary for unattached men in Camp cookhouses to spend much of their weekends drinking, largely for lack of other things to do. The pattern described is unfortunately common in comparable communities elsewhere, and it is doubtful if the situation is any worse than in some Scottish Islands. Indeed one saw less evidence

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1 At least one case of a family being helped to a quite substantial extent by a senior official from his own pocket.

of drunkenness than would probably be apparent in many small coastal communities of the North Atlantic. Nevertheless problems do stem from drinking in spite of restriction on supply of alcohol in most company stores in the Camp and controlled licensing hours in Stanley. There are usually a dozen or more persons on the "Black List" (a register of persons to whom, by law, alcohol cannot be supplied) and the police report that drink is a common factor in local delinquency. Again there is certainly cause for some attention by a social worker.

The churches. At the 1973 Census 54 per cent of the population declared themselves as Church of England, 27 per cent as Non-Conformists, and 11 per cent as Roman Catholics.[1] As has been mentioned the churches are active in various welfare fields, not confining their role to members of their denominations. However, the difficulties and expense of travel mean that their influence is a good deal stronger in Stanley than in the Camp.

1 These figures do not necessarily reflect formal membership.

CHAPTER 6 - AGRICULTURE

RESOURCES

These will be described in terms of the natural environment, the farming establishments and the livestock resources of the Islands.

Climate

The climate of the Falklands is cool maritime. The main features of its weather are narrow temperature range, strong winds, seasonal uniformity and considerable day to day variability which can also apply to any 24 hour period. Long term weather records exist only for Stanley and, although little is known of the variation throughout the Islands, it is generally believed that substantial differences occur particularly between the mountain areas and the lowland.

At Stanley, the mean monthly temperature varies between 9°C in January/ February and 2°C in July. No month is entirely frost free and therefore susceptible crops are at risk during the growing season. Soil temperatures are generally low and vary little. At Stanley the average at 4" depth is 2.1°C in July and 9.9°C in January. This places the Islands at the cold limit of the southern cold temperate zone with the consequence that the growing season is limited to 6 months, and the strength of growth and the potential response of grasses to nitrogenous fertilisers is limited.

The average rainfall for Stanley is approximately 635 mm and is spread evenly throughout the year. The number of days with rain is high in every month but falls exceeding 12 mm are infrequent. Several settlements record rainfall and the following table gives some indication of the variation between farms.

Table 22. Average Annual Rainfall in Selected Locations 1965-1974

Farms	Average Annual Rainfall Range (mm)	UK Avg.*
Port Howard	600-650	750-2,500
Hill Cove	550-599	
San Carlos	550-549	
Darwin, Fitzroy	450-499	
Fox Bay, Pebble	400-449	
North Arm	350-399	

* Pastoral areas.

Source: FIG.

The pattern is not a linear one travelling in any direction over the Islands but is chiefly influenced by the relative position of farms to the land mass, the high ground and the prevailing wind.

Accumulations of snow are rare; falls can occur in any month but soon clear away.

Relative humidity is high and total cloud cover is frequent; sunshine levels are fairly low (35 per cent), although somewhat higher than historic UK levels.

Persistent wind is a feature of the Falklands weather, westerlies prevailing. The high annual average speed of 16 mph with little seasonal variation contributes greatly to the high evaporation rate. A combination of high wind and rain or snow during lambing and the shearing season are recognised hazards which affect the survival rate of sheep at those critical times.

Terrain

As Figure 1 (following page 1) shows, West Falkland is generally hillier than East Falkland, with its mountain areas being more scattered. In East Falkland the mountains form an E-W backbone running from Stanley to San Carlos. Approximately 2/3 of East Falkland and 1/3 of West Falkland are low lying.

The mountain areas are of little agricultural importance because of outcrops of rock and extensive areas of boulder strewn terrain and stone runs. These areas are unenclosed and largely unused except for summer grazing for the less demanding type of stock.

Soils and vegetation

Soils. Falklands' soils are generally poor and uniformly acidic, chiefly lying as they do over large areas of thick peat, under which the principal

rock formations are hard and soft sandstones. From the King Report 1969 and the Davies Report 1971, analyses of soil samples taken at various sites revealed an average pH number of 4.5. These indicate that the lime requirement for arable production is approximately 5-6 tons of ground limestone per acre and 2-3 tons to initiate improvements associated with lowering acidity under grassland. Their phosphorus index values of 1 or 2 show that the application of phosphatic fertilisers should bring about improvement and would be particularly beneficial during the establishment phase of grass/clover swards. Potassium and magnesium values were adequte but both cobalt and copper levels were low.

However both reports conclude that the general use of lime and fertilisers could not be justified.

Vegetation. Falklands vegetation has been described as "notable for its monotony and total absence of natural tree growth." This is somewhat surprising, since wooded vegetation would be expected to grow in the southern cold temperate zone. The indigenous grasses of the area are generally poor in nutrition value as a consequence of the local climate and soil conditions. There are two principal exceptions to this.

1. Tussac grass (Poa flabellata) grows in clumps, with its stool or trunk up to 6 feet high and with long thin spreading leaves. The leaves are succulent, reasonably nutritious and are of high agricultural value by virtue of their being winter green and so providing winter feed. It is found in coastal belts up to 400 metres or so wide, particularly on the small islands. However, as a result of the activity of sealers, and uncontrolled grazing since the settlement of the islands, the tussac associations have been very seriously diminished and in many areas totally destroyed. Most farms are now taking action to restore the tussac through planting and fencing.

2. Species of meadow grasses are found principally in the coastal greens and the valley greens. Growth in the former areas is stimulated by the droppings of sea birds and penguins. Penguins also help to improve the

vegetation by their trampling activity. The valley greens are situated on stream and river banks around springs and are usually surrounded by the poor whitegrass (Cortadeira pilosa) communities with the result that the greens are heavily grazed by both sheep and geese. The valleys provide valuable shelter, particularly at lambing time.

The remainder of the grasslands of the Falklands are poor, the worst being the Mountain associations of lichen and cushion plants at the highest elevations and the marsh formations on its very wet deep peat banks. The largest category of grasslands is the oceanic heath which is undulating and often poorly drained. This is divided into two main types, one dominated by whitegrass (Cortadeira pilosa) and the other by dwarf shrubs principally diddle-dee (Empetrium rubrium). Davies (1971) found that whitegrass in various forms and combinations covered 60 per cent of East Falkland, 57 per cent of West Falkland and 39 per cent of the Island camps. The area of whitegrass in bog formation and greens for the three zones was 15 7, 4 76 and 25 4 per cent respectively; reseeded land accounted for 0.66, 1.79 and 0.54 per cent This was based on a survey of 23 farms and 392 camps.

Diddle-dee is heather like and produces small red berries (which the Falklanders make into jelly) but is of little value to sheep. Indeed large tracts of diddle-dee have been reclaimed and reseeded, chiefly with the imported grass, Yorkshire Fog

The other two smaller categories of grassland are the Sandgrass and Bush associations Marram grass (Ammephila arenaria) and lyme grass (Elymus arenarius) have been introduced to stabilise sandy areas and are grazed heavily when not protected.

Land is also locally classified as 'hard' and 'soft' camp, the terms referring to the ease of travel which depends largely on the thickness and water content of the peat. As will be described more fully in the Transport section (chapter 9), camp travel is arduous and there is no doubt that the condition of the camp tracks and the nature of the soil pose severe limitations on the manner and speed with which general farm

operations can be carried out. The diddle-dee ground is usually 'hard' camp as this species of vegetation prefers the better drained shaly soils.

Farms

Farming Statistics for 1974/75 lists 36 farms. Seventeen are on East Falkland, 7 on West Falkland and 12 are on the islands. Out of the total of 36, 9 are "soletraders"/partnerships and another 4 can be defined as owner occupied in that the farm residents hold more than 50 per cent of the company shareholding. The other 23 farms are owned by a total of 14 companies; the Falkland Islands Company being the biggest landowner with eight farms, distributed throughout the Falklands.

A total of 2,882,331 acres is held on freehold and only 16,336 acres on lease from the crown. The latter comprises 3 small farms near Stanley and very small portions of five other farms. The distribution of farms according to size is shown in Table 23.

Farms on East Falkland are well distributed over the acreage ranges. West Falkland farms on the other hand are all found within the 50,000-300,000 range, most being in the 100,000-200,000 range. The majority of island farms are either less than 5,000 acres or are in the 10,000-50,000 range.

The majority of farms have established settlements at locations convenient to good harbour facilities. Since the farms are dependent on the shipping services to transport materials from Stanley and their main products, wool, skins and hides, to Stanley, the location of the shearing shed and storage sheds is usually only a short distance from the jetty.

On many farms, the buildings (shearing sheds etc) and their jetties are old and in need of replacement in the next few years.

Table 23. Distribution of Falkland Island Farms by Size, 1975

Acres	0-5,000	5,001-10,000	10,001-50,000	50,001-75,000	75,001-100,000	100,001-200,000	200,001-300,000	300,001-400,000
Zone								
East Falkland	2	2	4	1	2	4	-	2
West Falkland	-	-	-	1	-	5	1	-
Islands	7	-	4	-	1	-	-	-

Source: FIG.

The land in the immediate vicinity of settlements is enclosed and provides several paddocks which serve a variety of functions. These paddocks are, in some cases bounded by hedges, usually of gorse, which provide reasonable shelter for milking cattle and their young stock, the stud flock, and the troops of working horses. In many settlements hay is made from this grassland and where arable crops are grown it forms part of a rotation within these paddocks. Fertility in the paddocks is enhanced by the intensive grazing and manuring of the enclosed pastures and by high stocking densities during seasonal operations.

The camp beyond is divided by fence lines which take into consideration the terrain, the provision of different qualities of herbage for the various groups within the flock, and the need to facilitate the tasks of gathering and droving. Camps are of widely differing size. The majority (approx. 40 per cent in all zones) fall into the 1,000-5,000 acre range; camps in the 5,000-9,000 acre range account for approximately 25 per cent of the total on mainland farms. On the islands camps are generally smaller, those of less than 1,000 acres forming the second biggest group.

All large farms on both East and West Falkland have one or more outside shepherds' houses. These are located at strategic points and, like the main settlement, have a few paddocks for maintenance of a small dairy herd and sheep for mutton. The resident shepherd is responsible for the general surveillance of the flocks in the surrounding camps. The house also provides accommodation for those engaged in gathering and droving flocks. Many of these houses are now being transferred to the main settlements or are now empty because of a desire by managers to improve manpower utilisation, and the increasing reluctance of shepherds to live out. Some however remain only to provide temporary accommodation for farm staff carrying out various kinds of work in the vicinity. A consequence of this trend is a generally lower degree of flock supervision than hitherto.

Livestock

History. The early records of livestock in the Falklands show that wild cattle, introduced by De Bougainville, were the dominant feature during the period to 1850. During that time numbers fluctuated within the range 30,000-80,000 head of stock. Sheep numbers did not exceed 3,000 in any year; there were in addition about 3,000 wild horses.

The next 50 years were a period of rapid development and change. West Falkland was colonised and many of the present day farms in the Falklands were established. A dramatic change took place in the relative importance ot cattle and sheep. By 1870, despite the ravages of sheep scab, the sheep population was firmly established and had increased to over 60,000. Cattle numbers had decreased to approximately 15,000, decreasing further by the turn of the century to around 7,000.

The establishment of sheep ranching was largely due to the efforts of FIC who introduced Cheviots, which were subsequently crossed with sheep from South America. A favourable wool market in the 1870s boosted sheep farming to the point where wool production and export predominated and mutton ousted beef as the staple diet. In 1873 Falkland wool was produced in sufficient quantity and was of a quality such as to warrant separate listing in wool sales from that of the River Plate. By the turn of the century the sheep population had reached over 800,000, and several new blood lines had been introduced to improve the wool quality. Romneys made the most impact in this respect, but other breeds including Leicester, Lincoln, Merino, Cotswold and Shropshire sheep were also imported. Following the turn of the century, Corriedales from South American sources were introduced mainly to yield finer wool. The overall sheep population began to decline from this time.

Current population. The 1974-75 agricultural statistics give livestock population as follows:-

Table 24. 1974/75 Falkland Islands Livestock population

Sheep	-	644,014
Cattle	-	9,462
Pigs	-	28
Horses	-	2,754
Dogs	-	856
Poultry	-	2,399

The predominant type of sheep is crossbred. The current flocks carry a considerable proportion of Romney blood and an admixture of finer wool types such as Corriedale and Polwarth, which possess Merino blood at 50 per cent and 75 per cent levels respectively. These three breeds are well suited for flocks concentrating on the production of wool in the 50-60's quality range (see Wool Marketing), and to the environment of the Falklands.

Farms have tended to concentrate on producing wool in certain quality bands, either coarse (Bradford count 48-52), medium (52-56) or fine wool (56-60). Those of the lower end of the scale are predominantly Romney/ Corriedale and those at the upper range - Polwarth/Corriedale. Encouraged by the principal buyer, the Falklands clip has tended to move towards the finer end of the range in recent years; there has been a gradual elimination of the 48-50s.

Cattle are kept primarily for local milk and butter consumption, beef being regarded as a by-product and rarely justifying division between dairy and beef herds. Various mixtures of blood lines have been imported from Britain including Ayrshire, Shorthorn, Hereford, Red Poll, Welsh Black and Friesian.

The large population of horses reflects the method of shepherding in the islands. Substitution by landrovers for some activities is increasing, not so much as a productivity improvement but because of the drop in the number of skilled horsemen available to the farms, and has led to a decline of some 750 horses (21 per cent) over the last ten years.

The sheep of the Falklands are in good health with no major infectious or contagious diseases. This was confirmed by Davies in 1971 who concluded that neither internal nor external parasites present a serious problem; the present level of infestation shows that control measures against keds and hydatid disease are effective.

Agricultural products. Wool is currently the only major agricultural product exported from the Islands; salted and dried skins are exported in small quantities and occasional shipments of live sheep have been made to South America and the Middle East.

In the past various schemes to export mutton in different forms have been tried, but they proved economically unsuccessful. Canning was introduced at Port San Carlos and Darwin in 1911 but both projects had closed by 1919. More recently freezing was tried. During the few years preceding the last war up to 32,000 sheep were exported annually to Chile for freezing. The transport arrangements and low financial returns are given as the main reasons for its abandonment. The Colonial Development Corporation established a freezer at Ajax Bay which opened in 1953 only to be closed down two years later. The supply and quality of the mutton expected to come forward were grossly overestimated. The number offered failed to exceed 16,000 per season and a high percentage of them were rejected because of poor quality. The result has been that aged and surplus sheep have remained a problem. Between 25-30,000 are dumped as skinned carcasses annually, and provide only a manuring function, part of which derives from the sea birds attracted.

The disposal and imports of sheep within the Falklands over the last ten years is shown in Table 25 overleaf. The low number of sheep sold locally for breeding or further use, also demonstrates the lack of regional integration. The average number of sheep slaughtered per year for the last five years for Stanley and camp settlement was 13,375 and 8,080 respectively and represented less than half total disposal.

Local production of dairy products has never been carried out on a commercial basis of any scale. Most farms provide their own needs

but milk output per cow is low, particularly from the two Stanley herds which are grazed on the Common. In consequence both milk and cheese are imported in quite large quantities[1], and consumption per head per week of 2.3 pints is approximately half that of the UK.

Vegetables have been grown in the past in sufficient quantities to meet all the needs of both the camp and Stanley. This was actively encouraged by the Government during the war and in 1944, in addition to home grown produce, 146.5 tons of a wide range of vegetables were marketed. Yields per acre at the time compared favourably with the UK, particularly for root vegetables. Since then the tradition of growing vegetables sufficient for home needs has diminished and there is very little commercial horticulture. With increased demand in Stanley from visiting ships and Johnston Construction employees, a considerable quantity of dried and tinned vegetables is now imported.

1 In 1974 33 tons of evaporated and condensed milk and five tons of dried milk were imported.

Table 25. Disposals and Importations of Sheep for the Falklands, 1965/66-1974/75

	Sold locally for breeding or further use	Exported	Slaughtered				Imported
			Mutton		Skins	Other purposes	
1965/66	4,333		22,599		26,281	535	10 males
1966/67	3,449		22,978		31,135	2,030	16 males
1967/68	4,335		22,718		27,734	1,194	
1968/69	2,237		21,158		29,467	2,601	7 males
1969/70	5,060		22,782		29,323	514	1 male
			Mutton (Farm)	Mutton (Stanley)			
1970/71	809		8,354	13,033	32,741	3,131	2 males
1971/72	2,132		8,535	14,050	24,558	2,166	23 males
1972/73	4,359	518	6,848	13,309	12,319	1,202	88 females
1973/74	6,991	24,958	8,381	12,684	18,983	926	
1974/75	4,947		8,282	13,801	28,692	557	

Source: FIG.

AGRICULTURAL PRODUCTION AND PERFORMANCE

Before going on to analyse the current performance of sheep farming it is helpful to trace the development of agriculture in the Falklands and to describe the current practice.

Development and system of agriculture

Grassland use The present system of sheep farming has remained basically the same over the last 75 years. The introduction of boundary fencing at the turn of the century led eventually to further subdivision into camps which allowed more effective segregation of groups within the flock and easier management. Wool production from extensive grazing has remained the system of production best suited to the conditions, and natural resources of the Islands. It is essentially a pastoral system in its simplest form which needs to be operated with due regard to and understanding of the constraints, and an appreciation of the potential of the natural grassland and the preservation of its productivity.

The key factors governing the farming system are:

1. The short and seasonal pattern of vegetation growth;
2. the unattractive economics for general use of fertilisers;
3. very limited availability of winter feed from purchased foodstuffs and available crops.

In this kind of situation the number of grazing animals needs to be carefully adjusted and regulated by the condition of the animals at the end of winter. Overstocking and overgrazing leads to lowered performance, poor survival and eventually to poorer pasture with reversion to agriculturally useless plants. In the past failure to understand this process coupled with the mismanagement of whitegrass burning during the early stages of the wool industry, have left the present generation of managers with the problem of restoring the production potential of those areas now dominated by the dwarf shrub associations.

The importance of pasture improvement has been the dominating theme of previous agricultural reports. The Wannop Report 1961 laid stress on the value of fencing as a requirement of reclamation and pasture renovation. This encouraged many more farmers to invest in pasture improvement. Thus during the 60s thousands of acres, particularly diddle-dee areas, were brought back into production through the use of several methods of grassland improvement. The methods, which were assessed in the Davies Report 1971, included ploughing, rotavating, sod-seeding and oversowing according to the type of soil and herbage cover present. The heavy top growth in Diddle-dee area was destroyed prior to reseeding through carefully controlled burning, the use of slashing and smashing machines and by ploughing and rotovating. Timing of reseeding is critical: late summer - early autumn being the preferred season. Other problems included consolidation, lack of shelter and the slow establishment of seeds (most commonly Yorkshire Fog).

The renovation of whitegrass camp has not been tackled on the same scale as Diddle-dee camp. Disposing of the top growth through burning is not easy to control and the sown seeds seem to suffer from competition from the existing herbage.

Attempts to establish perennial legumes have also been undertaken. Their value as providers of high quality feed and improvers of soil fertility is well known. None, including white clover, has shown promise. The Falkland soils are too acid, too low in phosphate and too dry for their successful establishment.

Other methods of pasture improvement have included rotational grazing, resting of camps, fencing and burning, though fencing, while it has been useful in animal movement and handling, thus improving labour productivity, has not led to marked pasture improvement.

Many miles of ditches have been made using the Government owned Cuthbertson ploughs. The main purpose of ditching is to lead water away from local wet areas and to provide regular surface drains over the general camp. It is regarded as the first and very necessary step to land improvement and there is general agreement that the work should be continued, although its beneficial effects have never been quantified.

The Upland Goose (Chloeophaga picta picta) This subject is introduced in the context of grasslands. Farmers have long been aware of the competition between the Upland Goose and the sheep on the better pastures. Control of the goose population is extremely difficult and efforts encouraged in the past by government and by station owners through various incentives only proved partially successful. Recent estimates suggest that the population is around 0.75 million.

The goose is a hard grazer and able to close-crop the better swards. On farms which practise resting of camps the goose continues to graze without competition from sheep. Because of the very high rate of passage through the gut, the normal benefits of ruminant digestion in the form of mineralisation of nitrogen and potash resulting in greater plant production are thought not to apply in the case of geese. The damage incurred to cultivated crops such as oats at time of harvest, to newly sown pastures and to young brassica crops is particularly daunting and expensive.

The extent of the problem and possible means of control of the geese are the subject of study by the biologist member of the current Grassland Trials Unit.

Farm organisation and manpower. The yearly cycle of management operations - breeding, lambing, lamb marking, shearing, weaning, culling and dipping - is much the same for all the farms irrespective of size and type of ownership. This is shown in Table 26. below.

Table 26. The Timing of the Main Sheep Management Operations on the Falkland Farms

Operation	Onset	Commments
Mating	Late April-early May	For 6-8 weeks
Lambing	Early October	
Lamb marking	Late November	Late births in January
Shearing	Early November (rams, hoggets) Mid January (ewes)	At shearing.
Weaning	Mid January	Also later.
Dipping	March	
Mass killings	May	Culled stock.

Source: EIU.

Size of farm naturally governs the size of the labour force required and its structure; the size and layout of the shearing shed and its organisation during shearing; the number of discreet groups within an age-group of the flock; the means of gatherings for routine operations; and the scale of both machinery maintenance and of farm improvement programmes. The relative isolation of each farm and the lack of services within the Islands requires that each farm must necessarily be largely self-contained and traditionally manning levels have been related to peak requirements during shearing.

Even if communications were much improved, it is doubtful, with the important exception of shearing, whether the pressure of seasonal work on the bigger farms could be eased by movement of labour and machinery between farms. Those most likely to benefit would be the smaller farms owning fewer than 10,000 sheep (16 farms). Shearing gangs have been an important innovation in the last two years by allowing an improvement of labour productivity. On the bigger farms, initial problems of adjustment have occurred between resident shearers and a visiting gang operating in the same shed, though the problem has not so far been serious.

For a smooth and efficient operation the larger farms require a stable pool of highly skilled people with local knowledge, since the contract labour arriving from the UK has often been subject to a swift turnover. Managers also need to be supported by perceptive and adaptable young men who in time can fill managerial roles. The current development of the skilled workforce and of the future foremen and managers is not sufficient in many cases.

Sheep management. Although the general level of sheep management in an extensive pastoral system is one of minimal care, the way in which the vital management operations are carried out has a considerable bearing on both flock behaviour and the stress caused by relatively infrequent attention. To be efficient management requires not only a high level of stockmanship but also good organisation supported by adequate facilities to allow the task to be completed rapidly. In this respect, the contribution of a well-controlled team of dogs is very considerable.

The main aspects are:-

1. Flock size. There is a wide range of flock size in the Falklands. Table 27 shows the distribution of farms according to the number of sheep shorn during 1974/75.

As can be seen the small farms, though accounting for 47.2 per cent of the total, only provide 10.1 per cent of the sheep shorn. The next group with 15-30,000 to shear account for 41.7 per cent of farms and 51.6 per cent of the total shorn. Thirty eight per cent of the sheep shorn were on the four largest farms (11.1 per cent of all farms).

2. Flock structure. Farms vary little in flock structure. The average flock includes the following approximate percentages of each class - rams 1.5; breeding ewes 34.0; cast ewes 1.5; maiden ewes 9.0; wethers 33.0; hoggets 22.0.

3. Choice of camp. This is determined by the greater nutritional requirements of breeding ewes and growing sheep. Preference is therefore given to ewes followed by hoggets and maiden ewes. In general, sheep tend to be set-stocked;[1] attempts to cater for the particular needs of the breeding stock, during the early autumn and during the approach to lambing and early lactation, have rarely proved successful, although procedures such as camp resting and rotational grazing have been used.

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1 Set number kept in one camp for a period.

Table 27. The Distribution of Falkland Farms According to Number of Sheep Shorn in 1974/75

	-1,000	-5,000	-10,000	-15,000	-20,000	-30,000	-50,000	-75,000	75,000
East Falkland	2	3	2	4	1	3	-	1	1
West Falkland	-	-	-	-	1	4	2	-	
The Islands	2	4	3	1	1	-	-	-	-
Total farms		17*			15			4	
% of number of farms		47.2			41.7			11.1	
% of sheep		10.1			51.6			38.2	

* One small farm gave a nil return for number of sheep shorn.

Source: FIG and EIU.

4. Losses. Camps vary in stock carrying capacity and also the extent of natural hazards for the sheep, principally water courses and tidal bays. The extensive losses which occur each year are largely an interaction between the poor condition of the sheep and the prevalence of these hazards. Since disease is not a serious problem, the reduction of losses thus depends greatly on improving the nutritional potential of the camp and protection from its physical hazards. The extent of the problem is indicated by the need to mate four ewes to obtain one replacement: the restrictive influence of this poor survival rate is discussed later.

5. Breeding. The majority of farms have a similar approach to the organisation of their breeding programme. A small stud flock is usually bred to an imported or purchased ram. The selected male offspring from this elite group, are then used in the main ram producing flock which is made up of selected ewes and is the source of rams for the camp flocks. Owing to the high replacement rate in the ewe flocks, improvement through breeding depends entirely on the selection of breed of ram and type within a breed to achieve the desired objectives. The selection process, based on subjective judgement, takes into consideration size, constitution and mothering ability together with wool quality and uniformity throughout the fleece and the extent of face cover.

The actual proportion of blood lines within flocks is usually modified by changing the breed or type of rams; the alternative of importing groups of females being too expensive. The general lack of surplus female stock within the Falklands means there is little scope for change through transfers between farms. In the absence of a large population of any one pure breed and hence an organisation interested in promoting the identification and/or the sale of superior pure bred animals, farms have regularly imported rams. Numbers imported were much lower in the period 1965-74 than in the previous 10 years; only 59 male and 88 female sheep were imported, compared with 289 rams, mainly from Chile, over the previous decade (1956-1965). The source and number of males were as follows:

New Zealand - 25;
Tasmania - 8;
Chile - 18;
UK - 8.

All the females were from New Zealand.

Information on the breed of sheep imported is only available from 1970/71, since when the following breeds have been imported:

Females: Corriedale - 88;
Males: Corriedale - 12;
Polwarth - 6;
Romney - 6;
Perendale - 1.

The majority of farms turn rams out during April 27 to May 4 with some as early as April 19 and others as late as May 18, to remain out for 6-8 weeks; there is no attempt to determine the percentage of ewes mated or the conception rate. On average flocks require 3.5 per cent of rams.

6. Lambing. Mating over this fairly restricted period results in the lambings taking place in October/early November. Lambing is not closely supervised. Skilled shepherds tend to adopt a policy of minimal interference, assisting ewes in difficulty, attending cast sheep and, on some farms, skinning dead sheep.

7. Lamb marking and weaning. Lamb marking is carried out in fairly simple penning arrangements in the camps, usually at about 2 months of age. As it is the first count of both sexes, it does not provide information on the percentage of barren ewes or of losses between birth and marking.

Weaning, a critical event in the growth and development of the lamb, coincides with shearing on some farms and on others is determined by balancing the demands of the lamb and the need to prepare the ewe for mating in late April/May. The weaned lambs are transferred to camps of reasonable quality to allow them to continue growing without check and to reach a reasonable condition by the start of the winter period. On some farms lambs have to travel considerable distances immediately after weaning. The sexes are not separated at this stage and are then collectively referred to as hoggets. Segregation into maiden ewe groups and into the wether camps occurs after shearing at 14-15 months of age. Hoggets are normally given more supervision and are moved more frequently during their first winter than other classes.

8. Shearing and classing. Weather permitting, shearing commences in November and lasts for fairly long periods due partly to weather conditions, distances from outlying camps, and, for most farms, the policy of relying on the farms' own labour force.

The need to improve shearing methods is generally acknowledged. A shearing instructor from the British Wool Marketing Board toured the farms during two recent seasons and many shearers benefitted from his demonstrations and instruction.

Considerable interest is now being shown on some farms in the redesign of shearing sheds principally to allow easier handling, the adoption of more efficient procedures and therefore better working conditions. On these farms, preference is for the modern Australasian type of layout which has already been used on one farm.

The majority of farms class fleece into three grades - A, B or C - representing fineness and absence of faults. The farm classer, usually the foreman but sometimes the manager, is guided by tradition, experience and the advice of buyers. The result is that classifications between farms are not strictly comparable.

9. Spraying and dipping. Compulsory dipping still applies in the case of farms which have not eradicated keds, the only external parasite of sheep endemic to the Falklands.

Agricultural performance

The following assessment of the performance and productivity of the agricultural industry is based on the period 1966-75. Financial analysis is based on returns from the farms for the years 1970-74.

Overall performance[1]. The total number of sheep, numbers of sheep shorn and their wool production is shown in Table 28.

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1 Information relating to the livestock populations and output of the agricultural industry is derived mainly from the Government's Annual Stock Returns 1965/66-1970/71 and Farming Statistics 1971/72-1974/75.

Table 28. Sheep Numbers and Output of the Falklands 1965/66-1974/75

Year	Total sheep	Sheep shorn	Total wool clip ('000 kg)	Average fleece weight (kg)
1965-66	638,165	566,568	2,198.2	3.88
1966-67	627,367	567,959	2,089.0	3.68
1967-68	620,932	559,802	2,047.6	3.66
1968-69	635,236	565,807	2,108.8	3.73
1969-70	628,690	570,678	2,096.6	3.67
1970-71	637,359	568,996	2,075.2	3.65
1971-72	634,163	573,401	1,981.4	3.46
1972-73	612,508	564,776	2,003.2	3.55
1973-74	628,147	553,285	1,990.5	3.60
1974-75	644,014	565,631	2,138.3	3.78

Source: FIG and EIU.

There was no improvement in the number shorn, or in total wool clip during the decade. The fluctuation in the average fleece weight was largely the influence of environmental factors on performance. A comparison of the quinquennial averages for 1965/67-1969/70 and 1970/71-1974/75 reveals an underlying downward trend in the total wool clip which was mainly due to a fall of 0.11 kg in the average fleece weight.

Data on the weight of wool produced per sheep acre and also its value, is set out in Table 29.

Table 29. Gross Returns Per Acre* from Falklands Wool, 1966-75

Year	Weight (kg)	Value (p)
1966	0.87	39.2
1967	0.83	31.5
1968	0.81	32.4
1969	0.84	34.4
1970	0.83	30.7
1971	0.82	26.2
1972	0.79	43.5
1973	0.80	58.4
1974	0.79	87.7
1975	0.85	44.2

* Adjusted acre - total 2,516,284

Source: EIU.

The total gross income from wool for the five years 1966-70 and similarly 1971-75 was 168 and 260 pence per acre respectively. Whilst this represented an increase in real terms, it is significantly lower than the gross farm returns per acre from hill farming in the UK.

Regional variation. Wide differences in the levels of performance between regions of the Falklands have long been recognised, the superiority of the islands over the mainland areas being the most commonly quoted.

The data presented in this section compare two quinquennial periods 1966-70 and 1971-1975 and are derived from Government sources. However, only those farms (31 out of 36) with continuous records for 1966-75 are included. The allocation of farms according to region and type is shown in Tables 30 and 31.

There was considerable variation between region and type in the numbers of sheep shorn, with large farms (EF) showing the greatest increase (+4.2 per cent) and small farms (EF) the greatest decrease (-7.7 per cent).

The total wool clip decreased in all areas and on all types of farms by an average of 3.3 per cent with the least change on the small islands (-1.9 per cent) and the greatest on the small East Falkland farms (-8.5 per cent). The decline in total wool clip between the two periods was largely due to the fall in wool clip per sheep shorn (see Table 31) which probably reflects breeding policy aimed at eliminating sheep blindness or securing finer wools and not nutritional deficiencies.

Table 30. Average Annual Number of Sheep Shorn and Average Annual Total Output for 1966-70 (Period 1) and 1971-75 (Period 2)

Farms Type & acreage range	No.	No. of sheep shorn Period 1	Period 2	% change	Wool clip ('000 kg) Period 1	Period 2	% change
Small Islands 849-4,784	5	9,553	9,662	+1.1	43.2	42.4	-1.9
Large Islands 30,254-78,800	4	44,795	44,165	-1.4	184.4	175.6	-4.8
East Falkland							
Small farms 4,521-8,570	3	3,564	3,291	-7.7	11.8	10.8	-8.5
Medium farms 25,655-58,747	5	48,553	46,861	-3.5	766.8	159.8	-4.2
Large farms 97,709-373,460	7	257,312	269,444	+4.2	972.5	949.1	-2.4
West Falkland							
All farms 74,574-229,100	7	183,767	185,592	+1.0	688.5	675.0	-3.0
The Falklands* (approx 2,901,500)		565,163	515,218	-0.2	2,107.9	2,037.7	-3.3

* Date derived from Table 28.

Source: FIG and EIU.

Table 31. Average Annual Performance for 1966-70 (Period 1) and 1971-75 (Period 2)

Type of farm	No.	Wool clip per sheep shorn (kg)		Wool per acre (kg)		Acres per sheep shorn	
		Period 1	Period 2	Period 1	Period 2	Period 1	Period 2
Small islands	5	4.52	4.38	2.75	2.70	1.64	1.62
Large islands	4	4.12	3.98	0.98	0.94	4.18	4.24
East Falkland							
Small farms	3	3.31	3.27	0.70	0.67	4.72	4.86
Medium farms	5	3.44	3.41	0.79	0.76	4.35	4.51
Large farms	7	3.78	3.52	0.71	0.69	5.31	5.07
West Falkland							
All farms	7	3.75	3.64	0.63	0.62	5.96	5.90
"Improved" farms	3	3.76	3.69	0.79	0.78	4.77	4.71
The Falklands*		3.72	3.61	0.73	0.70	5.12	5.13

* Data derived from Table 28.

Sources: EIU and FIG.

The average decrease per sheep shorn in the Falklands was 0.11 kg. All farms showed a decrease in fleece weight the greatest being on the large farms (EF) (0.26 kg) and least on the medium farms (EF) (0.03 kg).

A most significant fact is that since there was little change in the stocking density;, it follows that output of wool per acre (which is dependent on fleece weight and stocking rate) has shown a decrease over all types of farms.

The data presented in Table 31 confirms the general opinion that the most productive farms are on small islands. The range in performance for the two periods and for the three criteria of performance listed, was as follows:

Table 32. Range and Ranking of Farm Performance

	Wool clip per sheep (kg)	Wool per acre (kg)	Acres per sheep
1966-70 (all farm)	4.52-3.31	2.75-0.63	1.64-5.96
1971-75 (all farm)	4.38-3.27	2.70-0.62	1.62-5.90
Small Islands	4.08-5.27	2.43-4.22	2.08-0.97
Large Islands	3.71-4.49	0.49-1.65	7.99-2.73
Small Farms (EF)	2.54-4.53	0.45-1.38	6.77-3.29
Medium farms (EF)	3.24-3.58	0.16-1.18	19.66-3.03
Large farms (EF)	2.97-3.67	0.33-0.99	8.96-3.72
West Falkland	3.27-4.19	0.41-1.06	8.05-3.95

The variation in levels of performance between different areas can chiefly be attributed to differences in soil fertility and herbage quality. The variation between farms within an area gives an indication of the improvement potential. The range between farms in Table 32 and suggests that the scope for improvement between the best and the worst is 10 per cent to 30 per cent.

Previous grassland improvement schemes. During the last 20 years many farms have made much effort to improve the grassland by adopting one or a combination of the recognised methods. This particularly applies to diddle-dee areas on West Falkland where 1,000 of acres were reclaimed. Three West

Falkland farms - Hill Cove, Roy Cove, Port Howard - have undertaken major schemes involving reclamation and reseeding (HC and RC) and subdivision of pasture (pH). For these farms Table 33 below shows averages, for four quinquennial periods, for number of sheep shorn, total wool clip, wool clip per sheep and acres per sheep.

Table 33. Levels of Performance on Three West Falkland Farms

	Sheep shorn	Total wool clip ('000 kg)	Wool clip per sheep (kg)	Acres per sheep
Hill Cove				
1956-60	27,226	96.6	3.55	5.40
1961-65	27,588	103.6	3.76	5.33
1966-70	29,529	107.6	3.64	4.98
1971-75	30,765	110.9	3.61	4.78
Roy Cove				
1956-60	14,358	58.4	4.07	5.19
1961-65	15,628	66.8	4.28	4.77
1966-70	18,912	78.6	4.15	3.94
1971-75	18,860	79.0	4.19	3.95
Port Howard				
1956-60	30,945	126.5	4.09	5.59
1961-65	33,214	133.2	4.01	5.21
1966-70	34,223	124.4	3.63	5.06
1971-75	34,227	119.9	3.50	5.06

Sources: FIG and EIU.

All three farms considerably increased the number of sheep shorn during the twenty years and this can also be seen in terms of improvement in stocking rate. Only one of the farms (HC) continued to increase numbers in the last period (1971/75) but at a lower rate. Increasing flock size was not accompanied in all cases by an increase in the total wool clip; the average wool clip per sheep was heavier on all farms in 1961-65 than in the two subsequent periods.

According to analysis of financial results presented in the Theophilus Report, the projects at Roy Cove and Hill Cove were "worthwhile and showed an internal rate of return of 16 per cent for Roy Cove and 13 per cent for Hill Cove after tax". Hill Cove were able to provide more recent data from

which the management has concluded that the value of the additional production has justified the investment in improvement. The results for Port Howard were "far from clear cut, due to change in breeding policy which resulted in a reduction in wool fleece weight".

Labour productivity. Theophilus (1972) drew attention to the relatively important high proportion of production costs attributable to labour and suggested that in the economic climate of the early 1970s, efforts to improve labour productivity would be needed. The variations in performance between types of farms in terms of wool output and number of sheep shorn per person involved in running the farm, are presented in Tables 34 and 35.

Table 34. Average Annual Output of Wool Per Man* (kg)

Type of farm	No.	1966-70	1971-75
Small islands	5	4,501	5,883
Large islands	4	4,250	4,620
East Falkland			
Small farms	3	1,842	1,536
Medium farms	5	4,659	5,155
Large farms	7	5,678	5,155
West Falkland			
All farms	7	4,554	4,788

* Includes youths and landgirls, owner or manager.

Source: FIG.

Table 35. Average Annual Number of Sheep Shorn Per Man

Type of farm	No.	1966-70	1971-75
Small islands	5	995	1,342
Large islands	4	1,032	1,162
East Falkland			
Small farms	3	557	470
Medium farms	5	1,356	1,512
Large farms	7	1,503	1,512
West Falkland			
All farms	7	1,215	1,316

Source: FIG.

With the exception of small farms (EF) and large farms (EF) all types of farm achieved an increase in output of wool per man, ranging from 9 per cent for large islands to 30 per cent for small islands.

All types of farm, except small farms (EF) showed improvement in the number of sheep shorn per man.

Flock performance. Figures for changes in the flock structure are given in Table 36 and show very little change. The relatively high proportion of wethers and low proportion of breeding ewes is the expected structure for a flock raised for wool as opposed to meat production.

Table 36. The Structure of the Falklands Flock

	Rams	Breeding ewes	Cast ewes	Maiden ewes	Wethers	Hoggets
1966-70	1.4	35.5	1.0	9.0	33.0	20.1
1971-75	1.3	34.9	1.7	8.8	33.1	20.2

Source: FIG.

Table 37 below gives the average lambing rate based on the number of lambs at lamb marking expressed as a percentage of breeding ewes on hand in the previous autumn.

Table 37. Average Lambing - "At Marking"

	1966-70	1971-75
The Falklands	63.5	63.5
Islands	68.8	69.1
East Falklands	63.6	64.1
West Falkland	61.7	60.8

The striking feature is not the change, which is small but the low overall level. The average level at dipping is 50 lambs per 100 breeding ewes. These rates are well below the genetic potential of the flock, and the reproductive and survival rates are well below the requirements of an effective breeding policy.

The explanation of this low level of performance lies in a high incidence of drowning and in the low level of nutrition of the breeding ewe particularly at the end of the growing season. This leads to a lower fecundity level, while poor winter feed sources also force the pregnant ewe to draw on inadequate body reserves.[1]

Financial performance

The method[2] used to assess the financial returns from wool production during 1970-74 is essentially the same as that undertaken by Theoplilus for the year 1969/70. The main purpose of the assessment in this report is to establish changes in the production costs and returns of the industry during the five-year period.

The same 20 farms were invited to complete a financial return as Theophilus sampled for 1969-70, though only 11 were returned during the time of the report. However the eleven farms were reasonably representative of the regions of the Falklands, East Falkland -6, West Falkland -4, Islands -2, and comparison of the average costs and gross income for the two sets of samples for the year 1969/70 were very similar.

Average costs and returns are shown in Table 38 overleaf. Only the main components of costs and returns are itemised.

Overall it can be seen that while costs grew steadily over the period, sales income fluctuated enormously according to wool price (the appearance of steady growth is misleading) with the result that gross margin as a percentage of sales varied from 1 to 48 per cent. The average for the period was 30 per cent. This margin compares very favourably with livestock production in the UK though the figure for 1975 will most probably be in single figures again and may even show a loss, as the average gross value of exported wool fell to 52.5 p/kg, while costs will have increased.

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1 The strain of late pregnancy and early lactation could be alleviated by lambing a month or so later than the current practice. Lambing would then take place during the second half of November, after the onset of the growing season and thus the new growth would reduce the nutritional stress of late pregnancy, and lactation would also benefit. The effect of this on the weight of the lamb at weaning and on its subsequent growth of development is currently under investigation; the initial results are quite promising. 2 Based on data provided by eleven of the twenty farms invited to complete a financial return using the same format as in the Theophilus report.

Table 38. Average Costs and Income, 1970-74*

(Pence per kg/wool)

	1970	1971	1972	1973	1974
Costs					
Wages	11.7	12.1	14.6	16.5	23.0
Management salaries	3.1	2.7	3.1	3.1	3.9
Materials	4.8	5.9	5.5	6.6	9.3
Depreciation	2.4	2.6	2.7	3.6	5.7
Others	3.1	4.5	3.9	4.8	8.3
Total production costs	25.1	27.8	29.8	34.6	50.2
Sales cost	5.9	5.7	6.7	6.1	6.7
Total costs	31.0	33.6	36.5	40.7	57.0
Income					
Wool sales	36.7	32.1	54.6	70.2	107.3
Total income	38.7	33.9	57.2	76.4	110.5
Margin	7.7	0.3	20.8	35.7	53.6
Margin as % gross income	20	1	36	47	48

* Company financial year, in 8 out of 11 cases calendar years.

Source: EIU.

Costs. Total costs increased at an average rate of 12.5 per cent/year. Production costs doubled over the five years, 80 per cent of the increase occurring during the last two years in consequence of world-wide inflation, while sales costs increased by only 13.5 per cent.

There were marked differences in the changes in the main items of production costs. Wages, materials depreciation and other items increased the most and, management salaries the least. Wages are tied to the cost of living (see Chapter 4) but the sharp increase in 1974 is partly attributable to the effects of the basic wage adjustment involving payment of a bonus linked to the higher prices in the previous year. The rise in the cost of other items is a result of inflation, although the very sharp rise in depreciation must reflect a change in company accounting practice long overdue in some cases. The main items accounted for different proportions of production costs from year to year, but moved within the following ranges:

	% of costs of production
Wages	43.8-49.0
Management salaries	7.8-12.5
Materials	18.5-20.6
Depreciation	8.9-11.3

The proportion shared by wages and salaries is higher than that for hill farming in the UK and would imply further room for labour productivity improvements.

There was considerable variation between farms in costs, and income. The range of the variation for 1971 and 1974, chosen to represent a year of low wool price and high wool price respectively, is presented in Table 39.

Table 39. Range of Costs, Returns and Margins for 1970-74
(pence per kg of wool; min-max)

Main items	1971	1974
Wages	9.4-15.8	11.5- 31.2
Materials	3.3- 7.9	2.3- 13.2
Total costs of production	22.9-34.9	30.2- 76.4
Wool sales	28.2-37.8	79.2-129.5
Margin	-6.0-+5.2	23.8- 77.6

The extent of the variation suggests that there is considerable scope for improvement in efficiency on the farms with higher costs. In particular the wages item would imply that there are large differences of labour productivity for different farms, and this in part is related to variations in the amount of past investment in machinery.

What is perhaps also surprising is the large variation in the sales price of wool achieved for different farms. This is a function of the variation in quality and in marketing judgement.

Margin. The distribution of farms according to the margin between costs and returns shown in Table 39 above indicates the variation of profitability between farms. In 1971, six out of the ten farms made a loss.

CONCLUSIONS AND SCOPE FOR IMPROVEMENT

Examination of overall agricultural performance over the last ten years would indicate that for most areas of the Falklands wool output per acre has at best remained constant and more often declined. There are of course exceptions to this but it is generally the case that performance has deteriorated both at farm and animal level. In fact, the Falkland Islands wool industry has been in slow but steady decline since 1919-23 when the average number of sheep shorn per acre was 0.20 compared with the 0.19 for the 1971-75 period. Improvements of fleece weight are attributable to improvement of breed. The underlying trend in profitability of course is also related to the efficiency of the industry which has shown improvements in its use of manpower of the order of 5 per cent over the last ten years. In the last two years the effects of world inflation have more than offset this improvement. However, reported profitability of farms is obscured by the wide year to year variation in gross income from wool sales caused by fluctuations in the wool price.

There is little effective scope for increasing the total acreage available for sheep farming. Grazing on some of the small uninhabited islands has generally been found to be uneconomic for a ranch on the East and West Falklands because of the extra transport and shepherding costs. Other areas cannot be utilized, either because they are unproductive or they are protected for conservation reasons. Increasing wool yield per acre therefore depends upon improvements in:-

a. quality and utilisation of grasslands;
b. general sheep management;
c. breeding and selection of sheep.

This overall situation has been known for many years in the Falkland Islands and there have been no less than nine studies related to wool output commissioned since 1920. Most of them have reached the general conclusion that long term improvements must be the primary aim of the industry in order to improve the stock carrying capacity of the land. In most cases the proposed methods of improvement were based on experimentation and experience in other areas of the world, but it is only recently that

the decision to test the efficiency of these proposals in the Falkland Islands environment was taken. In this respect, the closure of the Anson experimental farm at Green Patch in 1928, and the absence of an effective Agricultural Department since the early 1950s, removed the facility and the organisation which could have given continuity to the investigation of problems and also support to the individual farm managers who have endeavoured to bring about improvement.

In general there is a high level of awareness of the problem amongst farm managers, a desire to bring an analytical approach to it and a wish to improve the situation.

The 1971 report of T. H. Davies following a detailed survey, emphasised the need for experiment and research in the Falklands in order to identify methods of improvement. The technical detail it provides results from several investigations undertaken by the team during a stay of seven months in the Falklands. This comprehensive assessment of the situation in terms of nutrition, health and management of livestock and of grassland improvement, provides a sound base for establishing the priorities and the planning of research and development in the agricultural industry. Following this report the Grassland Trials Unit was set up.

Scope for improvement

Grasslands. The generally low nutrition level of the Falklands grasslands, as has been highlighted by previous reports, has a detrimental effect on the basic processes contributing to the performances of sheep. These can be broadly classified as:-

1. fecundity;
2. survival;
3. growth and development;
4. replacement rate.

In the absence of other sources of feed at the critical phases of the production cycle, the solution must come from improved pasture production and control of grazing.

1. Pasture improvement

The vigorous approach to pasture improvement on several farms (particularly West Falkland) in the 1960s did lead to some increases in sheep per acre (see Table 33 page 111). The fact that this did not always lead to improvement in wool output per acre may be partly explained by changes in breeding policy resulting in fleece weight reduction. However, there is no doubt that the adverse climate and poor soil fertility pose an enormous challenge. There is general agreement that the cost of raising the level of soil fertility through large inputs of lime and fertilisers would be prohibitive. The improvement of the present level of production must therefore rely on methods suited to the current level of soil fertility.

The valley and coastal greens together with bog whitegrass represent the most useful herbage found in the Falklands and wherever possible should be fenced and grazed by sheep only during their periods of peak nutritional demand. Tussac falls into a similar category in that the established plantations need only to be fenced and confined to winter and early spring use. It has a wide range of use for both cattle and sheep and every encouragement should be given to the establishment of new plantations, some in conjunction with ewe camps.

Of the remaining plant communities, the most widespread are whitegrass in various forms and diddle-dee dominant types. Whitegrass communities are difficult to improve and there is little experience of whitegrass renovation. Diddle-dee areas on the other hand are much more readily improved mainly because they are "hard camp"; considerable experience has been gained of this form of improvement. The 1971 Land System Analysis Report based on photo-interpretation could contribute greatly to the location and estimation of areas suitable for improvement.

Scope for improvement therefore lies in making the most of the best grass-land through controlled grazing on the two-sward system or related variations for resting pastures, and in improvement of whitegrass and diddle-dee areas. This is the basis of the current programme being implemented by the Grassland Trials Unit. In designing systems for increasing pasture production, the Unit will have to take into account the

effect that large increases in costs will have on the financial viability for different schemes. In attempting to cut down on sheep losses, further attention should be given to drainage schemes with a view to improving waterlogged areas and eliminating hazard areas which are known to have a high incidence of drowning. The provision of bridges at strategic points could also help in this respect.

2. Pasture utilisation

The low soil fertility and generally adverse conditions place a high premium on this aspect of grassland improvement. It is probable that this aspect of improvement of agricultural performance has been too much neglected. Indeed the apparent adverse change in the vegetation of some areas is more a reflection of animal mismanagement than depression of soil fertility.

In many areas pasture improvement may not be practically or economically possible, so that the areas of improved herbage may have to be integrated into a system of alternate grazing using the better camp only at the critical phases of pre-mating recuperation and again at the end of pregnancy and lactation. In the improved areas, even grazing would ensure uniform regrowth of good quality herbage during the rest period. The effect of Upland Geese on the recovery rate of those areas could be critical, and emphasises the need to develop effective means of control.

Fencing is an important requirement of the whole scheme of improvement. In addition to separating the improved from the unimproved areas it makes gathering easier and more efficient, which in itself is an important aspect of ked eradication. Since the breeding ewes will occupy improved areas at relatively high stocking densities during both mating and lambing, close shepherding will then become more feasible.

Labour productivity and costs. Theophilus (1972) in his study of the economics of wool production concluded that labour productivity in the Falklands was low despite the considerable investment in mechanisation of the farms. He attributed this to the tendency for shearing requirements to determine the size and structure of the labour force resulting in under-employment for several months of the year. Several recommendations were put forward to improve the situation and these included:

- the adoption of improved shearing techniques;
- working over weekends during the shearing season, particularly following adverse weather;
- the reduction in number of employees and the hiring of a shearing gang;
- the need to review the role of the "non-productive" employees viz. cooks, common-gardeners;
- co-operation between farms;
- the transfer of outside shepherds to settlements;
- an improvement in the education and training of workers;
- the mechanisation of peat cutting;
- the possibility of simplifying the wage system including a reduction in piece-rate payments.

Farm managers and owners are actively pursuing some of these recommendations and some improvements are known to have already occurred; it is too early to expect changes to show in financial data which in any case tend to be distorted by the effects of inflation. Overall, however, the scope for reducing costs is limited though it varies considerably from farm to farm.

Since the publication of the report two shearing gangs have been established and are now operating. A shearing instructor has recently visited the islands during two shearing seasons and has generated much interest in improved techniques of shearing which in turn has improved efficiency. One consequence of economies in labour on some farms is an inability to carry out grassland improvement schemes. This situation could well be alleviated by the establishment of gangs, similar to shearing gangs, equipped to carry out camp maintenance and improvement contracts.

Many farms now have mechanised peat cutting. The transfer of outside shepherds to the settlements has been discussed earlier in this section of the chapter dealing with the system of farming.

The importance of training the labour force both to improve the level of manual skills and to develop management ability is of high priority. Vocational training and further education in agriculture is discussed in Chapter 14.

System of farming. Livestock production in the Falklands operates in relatively hard conditions with severe limitations imposed by the climate and potential of the soil. The system of animal production is dependent on grazed pasture with no inputs such as conserved grass, arable crops or purchased feedstuffs, at any stage of the production process, and since the physical limitations apply to most of the available land, regional integration cannot be considered. Therefore the scope for improvement is generally within the farm. The general conclusion, which the team do not have evidence to dispute, has been that the ranching system of sheep management is the only one suited to the Falklands. However to date there has been no systematic, prolonged attempt to examine the potential for improving output per acre by mixed and more intensive grazing methods on the better grasslands. There is still much to understand of the terrestial ecology of the Falklands.

There has been a general trend to transfer shepherds living in outside houses into the settlements, in many cases motivated by a desire to improve labour productivity. This process is more appropriate for a mainland farm than on the islands where it usually results in a change of stocking policy involving the replacement of breeding sheep by wethers. This change may produce short-term financial benefits but is not necessarily in the best long-term interest of the farm or the Islands as it does not exploit the full potential of the prime breeding areas. Nevertheless it is not generally believed that increases in the degree of shepherding will bring about significant improvements in performance.

Buildings and machines. Some farm buildings, shearing sheds, etc are now reaching an age where considerable capital injection will be required in renovation and renewal. This situation is most apparent for the jetties.

Most farms are well mechanised and have well equipped workshops in comparison to the UK hill farms. This is largely dictated by their size, isolation and the demands of the terrain. The scope for cutting depreciation and working capital costs through hiring of machinery and cooperative ownership is limited in view of the geography of the area. There is nevertheless some room for improvement.

Breeders and selection. The genetic potential of the breeds and admixtures of breeds found in the flock, chiefly Romney, Corriedale and Polwarth, is generally well suited to current market requirements. However, the range of quality between farms and within farms suggests that greater selection pressure and a more rigid breeding policy could bring about improvement through reducing the incidence of coarser grades and unevenness in quality within the fleece. At the moment selection pressure is limited to the male side; no effective selection policy can be undertaken on the female side until the level of fecundity and survival rate are greatly improved. Selection against wool-blindness has been pursued during the last decade and it appears that the incidence is now appreciably lower than in the early 1960s. The adoption of this very necessary policy may have contributed to some extent to the recent decline in fleece weight.

The variation in the average fleece weight between types of farms indicates that the majority of sheep are not exhibiting their genetic potential. The yield produced by sheep on small island farms approaches the published mean yield for the various breeds and their crossbreeds recorded in other parts of the world. Thus it is essential that each farm continues to undertake a re-appraisal of its breed policy to determine where improvements can be made and the changes required in the light of market needs. There is, however, an urgent need for information to be made available, both from the quantitative and economic aspects, on the interactions between stocking rate, fleece weight and fleece quality in the Falklands if breed improvement schemes are to be successful. Similarly information will be required on the various ways of exploiting improved reproductive rates.

Import of rams is likely to continue as the main means of introducing improved lines within a breed. It is in the best interest of those farms which import rams to test and then exploit their potential in the best and quickest way possible, usually in an elite stud. The first generation rams are then used on the main stud flock which in turn provides the large number of rams required for the camp flocks which have a ram replacement rate of 25-33 per cent. This is a lengthy procedure and one that dilutes the prepotency of the imported ram, partly due to the lack of objective selection of the females forming the stud flocks which form the top of the breeding pyramid. With an improved external air service, it would also be possible to import semen as an alternative.

A breeding scheme involving the performance testing of female stock for the stud flocks and the testing of rams prior to widespread use was drawn up by the Davies team but has not yet been implemented, although its practicability is to be tested by the Grasslands Trials Unit. Females, which have lambed at two years of age, would be selected on the basis of wool yield and quality and ability to rear a lamb to weaning under camp conditions. On the male side only those with satisfactory progeny, following their use at 7 months of age, would be introduced to the main stud flock for general use at 31 months of age. This scheme, based on sound principles, is not over elaborate and seems appropriate for the Islands.

Finally, with the Corriedale becoming numerically so strong in the Falklands, there is scope for the establishment of a breed society and an organised scheme of breed improvement.

Diversification. The scope for diversification is chiefly limited by the conditions and climate of the Falklands, and the distance from markets. The main benefits, if any, from a more mixed type of farming would be in grassland improvement.

Over the years various schemes for utilising the 30,000 carcasses of sheep, the main byproduct of wool production, have failed. Despite several attempts no satisfactory long-term solution has appeared so far. The

obstacles which have to be overcome are considered in Chapter 9, Industry and Crafts. The main problems relating to the present state of sheep production are the relatively low number available annually, the difficulty of collection from farms, and the variable degree of finish of the sheep that could be presented for slaughter. Until there is a significant improvement in the quality of pastures, and unless a nearby outlet is found for inferior meat, the problem of carcass rejection will remain. Only those producers in the more favoured areas such as small islands and farms with access to tussac can contemplate producing animals with an adequate finish in the late autumn and winter. The majority of producers would be committed to selling at the end of the growing season in late summer or early autumn irrespective of the condition of the stock and the price then obtainable.

However, there are three agricultural activities not associated with wool production that do warrant further consideration.

1. The production and supply of milk for Stanley

As described previously on page 98, milk production for Stanley is carried out by two farmers but yields are poor and distribution erratic, and milk hygiene is sometimes in doubt. Potential demand is sufficient to consume twice the current output and improvement in the situation is needed in the public interest. However, implementation of the recommendations in the 1974 Brown Report specifically on this subject would have involved Government expenditure of about £60,000 (£60 per head of the Stanley population) and so a more economic solution is required.

The range and yield of crops grown in the Stanley area and the level of milk production attained by the dairy cows, under the guidance of the staff of the Department of Agriculture, during the 1940s, provide good evidence that the Stanley area, including the common, has the capacity to support milk production on a commercial basis.

2. Production and supply of other livestock for Stanley

Beef supply is spasmodic and ill-coordinated. Many of the problems could be overcome if the beef herd was close to Stanley. Pig meat too is virtually unobtainable, and poultry is often in short supply; the same general comments apply.

3. Commercial horticulture

Without doubt there is a need for commercial vegetable production in the Falklands, particularly for Stanley. This could include glasshouse vegetables and fruit. From the marketing point of view production should ideally take place in the environs of Stanley. At present the only commercial unit operates from West Point, a small island in the west, where a business growing a wide range of vegetables has been developed from the cultivation of one acre of well sheltered land. A 200 sq ft polythene house is currently being tested and if successful further expansion is envisaged. Several outlets have been established by this producer, particularly a cruise ship, and output could be increased given better transport facilities to Stanley (see Chapter 10 Transport and Communications).

The same problem is also faced by many individuals around the Camp who market their garden surpluses in Stanley. In addition to cheap and regular transport to Stanley, access to fertilisers (manure from a dairy unit would be suitable but otherwise imports of reasonably priced inorganics) and adequate shelter are vital. The latter is needed on account of the persistence of the wind and the occurence of frosts and falls of snow during the height of the growing season.

Wider ownership of agricultural land

In an agricultural structure where the great majority of farms are large absentee-owned ranches whose owners are often not resident in the Falkland Islands, it is inevitable that there should be considerable interest in the

possibility of increasing the number of Falkland owners by the creation of more small holdings. Currently there are only ten farms, representing 4.8 per cent of the total area, which are run as family business by Islanders. Of these seven are owner-occupied and the remaining three leased from the Crown and other farms.

There is an increasing feeling amongst both farm employees and managers of the need to provide Falkland Islanders with a greater stake in their own economic future. At the same time there is a marked scepticism on the part of other managers of the benefits of such a development. They believe that the break-up of existing farm units would have a detrimental effect on output and so too on incomes and tax revenues, thus threatening the economic viability of the community. Subdivision in South America has often had this result, but parallels are dangerous to draw as the circumstances and manner in which the process occurred varied enormously.

The main arguments for a wider ownership are:-

1. Beneficial social effects would arise in terms of counteracting dependence, encouraging enterprise and initiative and deterring emigration[1].

2. Some of the farm companies are not farming the smaller islands to their full potential and are in the process of closing down small settlements on islands.

3. Small farm operation could facilitate more intensive use of land and provide the opportunity to assess the effect on grasslands of a mixed and more intensive form of grazing.

4. Labour productivity is high on small islands.

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1 There may well be people in UK who would be attracted by the opportunity to acquire a farm "away from it all".

5. Smaller sheep farming units on good farming land, in areas of wildlife interest or on sites close to Stanley could form the basis for diversification into dairying, meat production, horticulture and tourism.

6. Investment by Islanders in the Falklands would be encouraged.

There would of course be a number of disadvantages, principally the risk of different breed policies affecting wool quality, underutilisation of facilities and sub-optimal operation, all affecting profitability and taxes. However, the team concludes that, with the energy and initiative stimulated by having ones own business, the potential economic disadvantages would be counteracted.

Any programme for smaller farm creation would need Government backing, the availability of finance on favourable terms, agricultural and financial advice for the new farmers and a climate of goodwill on the part of the existing owners and managers of large farms. There would be questions of minimum farm size and whether owner-occupancy or tenancy arrangements should prevail. A precedent has been set by a family who in the 1960's settled on an island of some 850 acres and has farmed it as an economically viable unit. Hard and fast rules would seem to be inappropriate since potential areas will vary in size, people's aspirations and ambitions will differ, as will scope for developing other activities. However, as a general rule a lower limit of a capacity for 1500-2000 sheep would seem desirable. Similarly a flexible approach to tenure would seem to be called for; both present and potential owners or tenants, should be able to choose the arrangements which seem to be mutually satisfactory, with appropriate safeguards for the public interest.

Islands. There is no doubt a number of smaller islands, now owned by farm companies, appear to offer the basis for a programme of small farm unit development. These include Lively (possibly 2 units), Bleaker, Speedwell (possibly two units), George, Barren, Ruggles, Beaver, Saunders (2 units) and Golder's islands.

These and others offer a potential of over 20 new units. Many of them already have facilities such as jetties, sheep shearing sheds and pens, and housing either in use or capable of renovation. Island units minimise capital requirements for farm establishment, as sub-division fencing costs are reduced. The generally higher fertility of islands and also the presence of tussac, provides scope for production of animals in excess of the flock replacement requirements and thus opportunities for sale of breeding stock or lambs for meat.

The disadvantages of small islands should not, however, be overlooked. On the present basis of service provision, the costs to the community of medical, RT and air services tend to be higher for people in isolated situations than in the larger settlements. There are also the social disadvantages of creating a number of small, isolated units whereas, socially, there is a need to build up the smaller and even medium-sized mainland communities to enable a richer community life to flourish. Only certain people have the resources and self-sufficiency to live contentedly in such a situation.

East and West Falkland. The creation of small units on the two main islands also needs to be encouraged, since they would perform a somewhat different social and economic function. The areas of relatively good farm land are few, however, and most form an essential part of existing farm units as ewe camps. Some managers have identified peninsular areas which could be hived-off without damaging the viability of the farm or significantly affecting profit potential. There are also some farms which could be conveniently sub-divided into a number of tenant farms and with the existing owner switching to the role of estate manager.

A third type of mainland small farm unit would be of the more diversified type, supplying Stanley with dairy products, vegetables and possibly other livestock. These would be particularly suitable for the vicinity of Stanley. However, the poor performance of small farms in East Falkland (see Table 33 and 34) should be noted, although, in the absence of a detailed investigation of each, a conclusion of non-viability would not seem justified. Small units on the mainland are likely to be more

demanding of initial capital investment in housing, farm facilities (although sharing or renting from existing farms may be feasible) and possibly fencing. For those geared to the Stanley market, roads would be essential, not only from the business point of view but also to facilitate social contact.

Conclusion. The creation of small farm units gives rise to many considerations, and there is no doubt that such an agricultural development would have to be undertaken with much care, if it is to be successful. However we feel that there are strong social and, possibly, economic reasons for creating small farm units in the Falkland Islands, and we would urge that the matter should receive early consideration.

Transport of wool to the market

Wool is classed to broad specifications in the farm wool shed, and baled under the farm mark. The bales of wool are then stored in the wool shed, which is usually situated close to the farm jetty until the next visit of the coastal freighter, the MV "Monsunen" (see Chapter 10). From the time the wool is loaded on to the Monsunen until removal from the warehouse in Bradford after sale, the wool is basically[1] the responsibility of the FIC which arranges transport, storage, insurance and sale on behalf of most farms. The Monsunen carries the wool to Stanley where it is stored at FIC's wool store, on the FIC jetty, to await the next trip of the charter vessel, the "Anne Bewa", to the UK.

The charter vessel, which can move the total Island clip on three of its four annual voyages, carries the wool to a private wharf at Gravesend. From Gravesend the bales are taken by road to a warehouse, run by Bower Green Warehousing Ltd, in Bradford where they are stored pending sale. The road transport is arranged by Jeppesen Heaton, who contracts to carriers on behalf of FIC. The wool remains in the warehouse until after sale when it is moved to the buyer's warehouse or, on the buyer's instruction, to a mill for processing.

Sale of the wool

Wool characteristics. Falkland Islands wool falls in the quality range 48 to 60 with the bulk of 56 quality. It has a number of important characteristics, which place it in the category of a speciality wool, namely:

- softness;
- whiteness;
- cleanliness (free of vegetable matter);

1 FIC does, of course, use various carriers for different stages of the journey e.g. Coastal Shipping Ltd, in the Islands, which themselves have responsibilities for that stage.

- strength;
- crimp and lift of staple (springiness although fine);

These characteristics make the wool generally attractive for high-quality knitwear and for blending with other wools for a wide range of hosiery and woollen products. It is also technically suited to the currently less profitable worsted cloth manufacture and is used for this where the amount of vegetable faults in the wool makes combing a necessary process. Whilst Falkland Island wools generally possess good "knittability", fibre thickness tends to vary along the length rendering them unsuitable for micron testing, the now standard method of assessing fibre quality for subsequent processing. About 20 per cent of the clip is composed of necks, pieces, locks, bellies and other oddments which sell at a heavy discount. The clip from some farms has a relatively high proportion of course britch wool (up to 5 per cent) which is only suitable for carpet manufacture. This is largely due to inconsistent breeding policies.

Until 1972, the Islands' wool clip was sold at public auctions, conducted by Jacomb, Hoare and Company (Bradford) Limited, wool brokers, who also arranged inspection of the wool. Because of the increasing costs of staging the auctions (which were passed on to producers), coupled with poor wool prices, FIC, after consultation with the Falkland Islands Sheep Owners' Association and principal buyers, decided to abandon this method of selling and conduct its own telephone auction.

The telephone auction system initially involved only two potential purchasers, namely David Smith and Company (DSC) and Jacomb Hoare, who has always been a major buyer of Falklands wool. Hammand and Company, another broker based in Birkenhead, now also participates (but has yet to make a purchase) having become interested in Falklands wool in 1974 after concluding a few private deals with independent farms. The telephone auction system works as described below for the independent farm companies; decisions as to what wools should be sold from FIC and the 2 largest independent farms are made by FIC in London.

- FIC in London decides to hold a telephone auction, usually in response to demand from either DSC or Jacomb Hoare and notifies FIC in Stanley of the intention.

- FIC Stanley informs farms, by radio broadcast, and they cable FIC in Stanley advising the quantities and qualities of their wool which they wish to offer. Sometimes farms specify reserve price.

- FIC Stanley cables London with the information received from farms.

- On receipt London holds the telephone auction and obtains bids. The participants are expected to use their existing knowledge of wools from the various farms, there being no inspection of samples.

- Details of the bids are cabled to Stanley, for onward transmission to the farms and they accept or reject the bid (although they usually lack market information on which to base judgements) notifying Stanley accordingly.

- FIC Stanley notifies FIC in London which concludes the business with the bidders.

The telephone auction has advantages over the public auction in being cheaper to stage, less subject to the risk of rigging and providing greater flexibility in that offerings can be more frequent, involve portions of clips or offering forward, and be spread over a longer period[1]. With the public auction, prices could be depressed on the day of the sale and result in an unrealistically low price for a significant part of the clip. Although the telephone auction method precludes inspection of wool samples, in practice the situation is little different from the public auction as the inspection facilities by themselves were insufficient for buyers to

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1 Apparently FIC helps with the process of spreading sales over a period by holding back wool from its own farms when offerings from independent farms are substantial.

make meaningful judgements. For newcomers to participate in the auction would require an investment involving a visit to the Falklands, obtaining samples from farms and possibly processing the samples. As with the public auction the present system does therefore tend to offer built-in protection from competition to the existing buyers.

In 1970, as a form of forward integration into a processing firm, FIC - the main wool producer transport and sales agent - purchased a 50 per cent shareholding in David Smith and Company (DSC). DSC's main operations were breaking down bales and sorting[1] in the greasy state and some scouring and top-making on a commission basis in other companies' plants. FIC considered that the acquisition would provide knowledge of the market and might provide scope for promoting Falklands' wool as a speciality with a distinct brand image.

Since this acquisition, DSC's share in purchases of the Falklands' wool clip has tended to increase, as has the proportion it has purchased as principals rather than agents. Thus DSC purchased some 60 per cent of the 1972/73 clip, 90 per cent of the 1973/74 clip (mainly purchased forward in May, June and July 1973) and 60 per cent of the 1974/75 clip. Currently well under 10 per cent of its purchases are sold to merchants in the greasy (sorted) state for blending with other wool, the rest of the wool being processed, either for woollen yarn after scouring and carding or for worsted yarn after scouring, combing and top-making. DSC aim to maximise the former (currently about three-quarters of the total) and only the wool that is too dirty is subjected to the additional combing process. DSC have not developed a specific Falklands brand name[2] but, by concentrating on high grade sorting and processing have been able to establish trade links with some manufacturers, particularly in Japan, Germany and Italy, in the high-class fashion knitwear market in which fibre price is much less important than quality.

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1 Involves the sub-division of individual fleeces into about 40 specifications according to the different parts of the fleece; wool with dirt, vegetable matter, or stains is separated from that clean enough for scouring. 2 Nor has the Sheep Owners' Association or FIC yet registered a Trade Mark.

Table 42 below, shows that sales costs both as a proportion of total costs and of total returns have declined over the last five years.

Table 42. Costs of Selling Falkland Island Wool, 1970-74

Year*	Sales costs as % of total costs	Sales cost as % of gross returns	Wool price P/per kg
1970	19	15	38.7
1971	17	17	33.9
1972	18	12	57.2
1973	15	8	76.4
1974	12	6	110.5

* Season is that ending in the year indicated.

Source: EIU survey, 1976. Sample of ten farms.

The figures suggest that the telephone auction is more cost effective than the public auction, although the boom conditions in 1973 and 1974, would have contributed to the proportionate lowering of sales costs.

Strict comparisons with marketing in other countries are not possible because key factors such as distance, quality and size of farm clip vary as do the items included within marketing costs. However, comparison with New Zealand is shown in Table 43.

Table 43. Average Prices of Falkland Islands and New Zealand Wool Clip, Clean Equivalent, 1964/65 to 1974/75 (P/kilo)

	Falklands Islands		New Zealand	
	Average Colony	Adjusted*	Average NZ auction	Adjusted*2
65/66	45	63	38	53
66/67	38	51	32	44
67/68	40	54	23	32
68/69	42	57	29	40
69/70	37	49	26	36
70/71	32	42	25	35
71/72	55	76	31	43
72/73	73	105	73	101
73/74	111	167	85	118
74/75	53	73	52	72

* Average Colony wool price reduced by sales costs and adjusted to clean equivalent on basis of average 63 per cent yield.
*2 Average NZ auction price (greasy) adjusted to clean equivalent on basis of average yield of 72 per cent.

Sources: FIG, IWS and EIU estimates.

The above Table confirms reports by wool merchants that the Falkland clip is superior to the New Zealand clip, being able to command an average price 25 per cent higher. This differential was maintained in a comparison between the first and second five year periods.

Future market prospects

Falkland Islands wool possesses a number of characteristics and advantages which should make it less vunerable to both short term fluctuations in price and also to the longer term decline in real returns arising from competition from other fibres.

These are:-

- distinctive qualities which make market differentiation and retention of custom easier;
- its main potential end-use is high-quality knitwear, in which consumer attachment to traditional fibres and styles is stronger than in most other sectors of the clothing industry;
- demand for knitwear has benefited from increasing interest in casual and leisurewear and no reversal of this trend is expected;
- a recent shift in taste in many developed countries in favour of natural products and against synthetic, whilst it should affect demand for all kinds of wool, is likely to be most strongly felt in non-price-sensitive sectors such as high-quality knitwear;
- it is less likely to suffer from technological improvements to man-made fibres, since achievement of improved water absorbtivity in synthetics seems unlikely.

Thus the qualities and end-use of Falklands wool are such that it should suffer less than other wools from man-made fibre competition and experience reasonable future prospects.

In our view the choice of a strategy for wool marketing should be guided by two principles :-

1. Making the most of the distinctive qualities of Falkland wool and,
2. maintaining a high price for Falkland wool whilst attempting to stabilise it.

We have in mind a coordinated marketing effort for Falkland Islands wool which would be under the control of all the Falkland Islands' farmers. This might take the form of either a Marketing Co-operative (possibly within, or developed from the Sheep Owner Association) or a Marketing Board.

The precise contributions, objectives, organisation and budget of such a Co-operative or Board would require careful definition, but we would expect that, inter alia, it might want to:-

i. maintain careful control over sorting and grading standard;
ii. pursue a long term policy of maintaining and enhancing the identify of Falkland wool among users;
iii. continue the present policies of minimising sales costs and handling;
iv. establish means for retaining control and ownership of the wool until the point when it is freely available to the market;
v. achieve representation in the UK - possibly via an agent;
vi. as far as possible spread offering of wool throughout the year to maintain interest and prices;
vii. develop a market information service to assist farming sales decisions;
viii. consider means of stabilising annual fluctuations in prices paid to producers consistent with achieving high average returns for the Falkland wool clip.

CHAPTER 7 - AQUATIC RESOURCES OF THE FALKLAND ISLANDS AND DEPENDENCIES

INTRODUCTION

This chapter describes the aquatic living resources of the Falkland Islands and the seas surrounding the Islands and their Dependencies. The area of sea considered lies between 45 degrees and 60 degrees south latitude and 20 degrees and 65 degrees west longitude, excluding the areas of coastal water within 200 miles of the South American mainland or west of a median line between that mainland and the Falkland Islands.

These resources are considered in the following sequence.

a. The aquatic life of the rivers and streams of the Falkland Islands.
b. The marine resources within 3 miles of the coast line of the Falkland Islands.
c. The continental shelf surrounding the Falkland Islands, including the Burdwood Bank.
d. The oceanic areas north of the Antarctic Convergence (see below).
e. The continental shelf surrounding South Georgia and Shag Rocks.
f. The oceanic areas south of the Antarctic Convergence (see Fig 6, page 175).

Some of these areas of sea potentially form part of an exclusive economic zone of the Falkland Islands or South Georgia, should such zones be established following the United Nations Law of the Sea Conference. It may be necessary to resolve the contested sovereignty over the Falkland Islands before such zones can be formally established. These issues, although of obvious importance to the future management of coastal fisheries around the Falkland Islands and South Georgia, are not debated further in this section. The boundaries used to sub-divide the marine areas have been chosen deliberately on hydrographic or biological grounds rather than linked to the likely extent of any exclusive economic zones.

OCEANOGRAPHY

Virtually the whole marine zone described in this section lies within the zone of southern circumpolar westerly winds and the surface waters, whose motion is imparted by this wind system, form part of the circumpolar current known as the West Wind Drift.

Although there is a general eastward set of the surface waters of around 8 miles per day, the seas in the south of the region also have a net northerly tendency and are cold because of melting Antarctic ice: this meltwater also lowers the salinity of the Antarctic Surface Water so that it floats upon a southward-flowing intermediate layer below. This cold Antarctic Surface Water has an average temperature of about 1-2 ^{o}C in winter and 3-5 ^{o}C in summer; nearer to the Antarctic Continent temperatures are continuously near the freezing point of sea water (-1.9 ^{o}C). The cold Antarctic surface waters cover about half the area of sea with which this section of the Report is concerned.

At their northern margin, the Antarctic Surface Water sinks below a warmer layer (the Subantarctic Surface Water) whose temperature ranges from 4-12 ^{o}C in summer and is some degrees lower in winter. The place at which this sinking occurs is known as the Antarctic Convergence. It is one of the most dramatic oceanic features in the world, resulting from the very sharp temperature gradient between the Antarctic Surface Water to the South of the Convergence and the Subantarctic Surface Water to the north of it (see Fig 6 in Chapter 7). It is also an ecological feature of great importance and the oceanic areas north and south of it differ substantially in their biological features. For this reason the zones north and south of the Convergence are treated separately in this Report.

One other feature of the Antarctic seas is of general importance. The northward flow of surface water from the Antarctic zone is balanced by intermediate water which wells up around the margins of the Continent, bringing to the surface a constant stream of dissolved mineral salts, important as a nutrient for the floating plant life on which the open ocean animals in turn depend. The Antarctic Surface Waters are thus mineral rich and highly productive despite their low temperatures: the Subantarctic

Surface Water does not benefit to the same extent from up-welling and is less productive. The region as a whole is relatively productive but it does not necessarily follow that there are fishing opportunities of commercial interest.

By far the greatest part of the world's catch of marine fish is taken from the waters overlying the continental shelves and slopes. Such fish include demersal species (those occurring on or near the sea bed) and pelagic species (those occurring in the water column or near the surface). In appraising the marine resources of the Falkland zone therefore it is clearly important to look with especial care at the areas of shallow sea. Although the Falkland Islands lie 300 nautical miles off the mainland of South America the sea between is everywhere shallow. To the north the 200 metre depth contour, which conventionally denotes the edge of the continental shelf, lies from 60 to 110 miles from the coast of the Islands. To the east, the shelf extends roughly 10 to 20 miles from the Islands and southward some 20-30 miles. Nowadays commercial trawlers and long liners often fish for demersal species in depths down to 600 metres or more and since the continental slope of the Falklands is quite gentle in most directions there are large areas of ground lying between the 200 metre and 600 metre contours. About 120 nautical miles south of the Falklands lies Burdwood Bank where the depths are less than 200 metres over an area roughly 200 miles by 50 miles. About 600 miles to the east of the Falklands, and also lying to the east and south of the Antarctic Convergence, which veers to the north in this part of the South Atlantic, are the Shag Rocks where there are areas of shallow water continuous with the large areas with depths of less than 200 metres surrounding the island of South Georgia. The extent of the sea areas around the Falkland Islands and the South Georgia group where demersal fishing operations could be attempted is therefore great and part of this sea area lies within the fertile seas south of the Convergence. Some pelagic species both of fish and crustaceans also occur in the deep oceanic waters. The resources of the Scotia Sea in the southern part of the zone with which this section is concerned are at present exciting particular interest because of the abundance there of Antarctic krill (Euphausia superba), a shrimp-like animal up to 2½ inches in length).

BIOLOGICAL CHARACTERISTICS OF THE FRESH AND MARINE WATERS IN THE FALKLAND ISLANDS AND THE ADJACENT SEAS

Freshwaters

The Falkland Islands have a moderate rainfall and a cool climate: much of the land is covered with a blanket bog of acid peat and the water draining into the small rivers, few of which have courses of more than a few miles in length, is acid and unproductive. There are two indigenous species of freshwater fish, Aplochiton zebra (locally called "native brook trout") and Galaxis maculatus (locally called "minnow"). These have to some extent been supplanted by brown trout (Salmo trutta) introduced during and after the Second World War. These trout are small where they depend entirely on the freshwaters for food but some have adopted a sea-going habit, migrating down to the estuaries to feed or even feeding entirely in marine waters but returning to the rivers to spawn. These anadromous specimens attain weights of over 10 kilograms. Attempts have also been made to introduce salmon but, as in neighbouring Chile, without apparent success.

Falkland Islands Coastal Zones

Four kinds of biological resource need consideration in the coastal zone within 3 miles of the Falkland Islands; seals, seaweeds, crustaceans and shell fish, and fish. There is also a potential for fish farming.

Fur seals, sea lions and elephant seals all occur in some numbers around the Falkland Islands although the exact status of their population is not clear. All species are likely to have been substantially reduced by hunting in the 18th and 19th centuries and to have made recoveries since then: there is some evidence that fur seal numbers are now static and that sea lions are less abundant than in the 1930s. At present there is an embargo on exploitation pending a thorough evaluation of the status of this potential resource.

Seaweeds are a spectacular feature of the coastal zone of the Falkland Islands as of other areas in the southern cold temperate zone. The dominant species is the giant kelp, Macrocystis pyrifera, which is the

largest seaweed in the world with overall lengths of up to 50 metres and this plant forms a "forest" around most of the coast line growing in waters of between 4 and 30 metres depth. Kelp is a source of alginates (colloidal salts of alginic acid) which are used as binders, stabilisers and thickeners in a large variety of products such as foodstuffs, pharmaceuticals, textiles, rubbers, papers and adhesives. The market for seaweed colloids is industrial and distinct from that for edible seaweeds which, although many times larger, depends on different species. Inshore around the islands there is a second large seaweed, "bull kelp" Durvillea antarctica, which might also be exploitable.

Crustacea and molluscs also abound in the Falkland coastal waters. Probably the most important from a resource point of view is the large spider crab similar to the Centolla which is esteemed as a delicacy in Chile and Argentina and is exported commercially from Chile. Shells washed up on beaches and specimens that have been taken from time to time by visiting ships suggest that these crustaceans may grow to a commercially exploitable size around the Falkland Islands but practically nothing is known about their distribution, migration patterns, abundance and availability. Even less is known about the distribution of crustaceans of the lobster, crayfish or prawn type: the only species of edible size known to occur is a "lobster krill" (Munida), a different genus from krill in Antarctic waters.

Very large mussels containing a high proportion of meat can be gathered in the Falkland Islands: these belong to the same species as are abundant throughout the Magellanic zone of Southern South America where they are in some demand for food. Large clams can also be gathered. No estimates of annual yield are possible for either of these species without a survey. Other shellfish of potential commercial interest are sea urchins (again esteemed as a delicacy in South America) and a small scallop. Squid and octopus are known to exist in coastal waters.

Coastal fishes are also abundant around the islands. Over 80 species of fish have been recorded, among them the species known locally as "mullet" (Eleginops maclovinus), "rock cod" (Notothenia spp), "smelt" (Galaxias attenatus

and Austromenidia spp), "pike" (Champsocephalus esox), "rock eel" (Austrolycus depressiceps), "herring" (Clupea fuegensis), sharks and others. Several of these are caught or gathered from time to time by residents. The owner of a one decked boat in Stanley sometimes fishes in his spare time in order to supplement his income; others indulge in fishing only as a spare time hobby from the beach or in small open boats within the sheltered sound and inlets and in shallow water rather than the open sea. While there is considerable speculation about the possibilities of the coastal fisheries, not much is known about the distribution and behaviour of the fish at seasons when they are not close inshore. Many local people, for example, have never seen a Falkland herring: despite some sea-going tradition Falkland Islanders have not had an active interest in sea fishing. Little is known about the size and availability of stocks, effective methods of capture or likely catch rates.

Of the three most important coastal species, the mullet grows up to 8 kg in weight and is regarded by most Islanders as good eating although some individuals familiar with North Sea fish do not appreciate it (the acceptability is said to vary with size and place of capture). This fish is said not to freeze and store well in domestic deep freeze cabinets but this does not necessarily mean that better controlled and more effective industrial methods would be unsatisfactory. The acceptability of mullet in export markets would certainly require testing: if it turned out to be available in sufficient quantity it might provide raw material for frozen fillet blocks for subsequent processing into fish fingers and standard portions. Sustainable yields, distribution and catch rates require investigation.

Rather similar limitations to knowledge exist about the smelt species and the Falkland herring, which sometimes appears in large shoals close inshore. Although of the same genus as the northern hemisphere herrings the Falkland species is small and said to be very oily. The commercial possibilities clearly cannot be judged without investigations into the distribution, likely yield and catch rates, and utilisation and marketing of the species.

Fish farming might form a viable adjunct to a developed coastal and offshore industry. The heavily indented coastline with many sheltered bays and narrow channels with a small freshwater run-off from the land and a good tidal flow provides what may be suitable physical conditions for the development of aquaculture for such fish as trout, salmon or turbot. Farmed fish require a food supply, the main ingredient of which might be fish meal (krill meal would be especially valuable for salmon in order to give its flesh the required reddish colour) or trash fish supplied by a local industry. Apart from the fact that marine fish farming is still in the experimental or pilot scale stages rather than being a fully proven technology, other difficulties lie in the identification of a ready market and in assessing whether the product can carry the costs of transport to that market.

Falkland offshore waters

The extensive areas of shallow sea around the Falkland Islands, outside the 3 mile coastal zone and to the south over the Burdwood Bank undoubtedly support substantial populations of fish. Those that are known to occur include skates and rays (Raiidae), sharks (Squalidae), herrings (Clupeidae), hake (Merluccidae) including long-tailed hake, blue whiting (Micromesistius australis), Notothenia species, snoek (Thyrsites atun), a species of Scombridae (mackerels), sea breams (Sebastodes spp) and others, many of which have common names in the languages of the mainland. Several of these resemble northern hemisphere species and some relationships are close, e.g blue whiting (Micromesistius australis and Micromesistius poutassou).

The fish species thought likely to be of greatest importance in the Falkland Islands are hake, including long-tailed hake (Macronurus magellicanus), croaker (Micropagon opercularis), blue whiting and Falkland herring.

Expert opinion is that the sustainable yield of blue whiting may be in the order of 1 million tons per year. The liver of this species can constitute up to 10 per cent of the total weight. The fish in some experimental catches have been heavily parasitised but it is considered likely that preferential fishing of the larger and older individuals would reduce the incidence of infestation to normal proportions. A stock of similar size, also largely unexploited, exists in the North Atlantic off the Hebrides and extending towards Faroe: the average size of the fish there is less than that of the southern stock. The hake (Merluccius hubbsi) is at the

southern end of its range of distribution and is not yet fully exploited in the areas to the north and west of the Falklands but large individuals have been caught, seasonally, south of the Falklands.

Vertical echo-sounders have at times recorded extensive and dense echoes in the Falkland Islands region that may indicate shoals of blue whiting, herring-like species or even squid. As for the coastal species, our knowledge of catch rates, seasonal distribution and movement of fish, and the best methods of capture is extremely scanty. Little is known about market acceptability, except for the hake.

Oceanic waters north of the Convergence

Very little information is available about pelagic fishes or crustaceans in the open oceans away from the shelf around the Falkland Islands and Burdwood Bank. These waters are however less rich than those south of the Convergence: the Antarctic krill does not occur in them (being replaced by Munida and other species which could possibly be of significance in a Falklands coastal fishery), and the waters are less celebrated as a former whaling ground. The pelagic fish and squid stocks of these waters require further exploration before it can be decided whether or not they constitute substantial resources.

South Georgia and its coastal and inshore areas

Fur seals (Arctocephalus gazella) and elephant seals (Mirounga leonina) are both abundant in South Georgia and the adjacent islands, the former having recovered from devastating over-exploitation in the 19th century. In the 1930s there were only of the order of a few hundred fur seals: by 1963 the population stood at around 11,000 and current estimates place it at 200,000 individuals. The population is still showing an exponential increase and could reach 2 million by 1985: at this level there would clearly be a substantial potential sustainable yield if the products could find a market. Traditionally fur seal have been chiefly of value for their pelts

and contemporary conservationist feelings against the wearing of animal skins, and especially against the exploitation of marine mammals, may well have reduced the marketing opportunities, even for a carefully managed fishery that does not endanger the stock and is based on a whole carcass operation rather than pelts alone.

Bull elephant seals were cropped for oil until 1964 since which time the population may well have increased. The sustainable yield is estimated at about 6,000 adult bulls, each weighing 2-3 tons and yielding roughly a hundred gallons of oil. This fishery was always conducted in the past as a subsidiary of, and linked to, shore based whaling in South Georgia and its economics were undoubtedly improved by the existence of facilities conferred by the larger industry. It is less certain how economic sealing on South Georgia, considered as an operation in isolation, would be but it is clear that there are substantial resources that could be exploited without endangering the stocks. Exploitation could become attractive, however, if it were able to make use of other processing plant on the island.

The same kelp (Macrocystis pyrifera) grows in South Georgia and in the Falkland Islands: it is abundant in sheltered waters at South Georgia and it is therefore a potential resource albeit less accessible and less easily harvested than in the Falkland Islands. Little is known about crustacea south of the Convergence; unconfirmed reports suggests that worthwhile catches of a small crayfish have recently been made there. The demersal fish of South Georgia waters are likewise not well known but the most important species appear to be Notothenia rossii (sometimes referred to as Antarctic cod), and Dissostichus species. Juvenile Notothenia rossii live in shallow water in the fjords and adults averaging 2-3 kg have been caught in trawl offshore. This species is of excellent flavour and texture and might command high prices on the west European market and elsewhere. Other species caught by Russian fishing vessels include the so-called ice fish or white blooded fish (Channichthyidae spp). The most productive fishing grounds appear to be well within a hundred miles of the harbours of South Georgia.

Open oceans south of the Antarctic Convergence

Throughout the zone south of the Convergence, but especially to the east and south of South Georgia (and extending into the coastal zone around this

island and its outliers), Antarctic krill (Euphausia superba) is abundant. This shrimp-like animal attains a maximum length of 60 mm with an average of 35-40 mm. It occurs in dense swarms and once these are located, high catching rates are possible. One estimate suggests that in the late 1930s the blue whales alone accounted for 175 million tonnes per year of krill: various recent estimates of the sustainable yield range from around 75 million tonnes per year (made in 1970 and now considered on the low side) through 150 million tonnes per year (now widely accepted but none the less lower than some estimates). As a basis for comparison, total world fisheries landings around 1970 were of the order of 70 million tonnes per year so that the enormous potential of this at present virtually unexploited resource is apparent. About 16 per cent of the body weight of krill is high grade protein.

The waters around South Georgia, in the same zone as now supports the very large stocks of krill, were formally the centre of the world's most lucrative whaling industry. The coincidence in range of whales and krill is to be expected because the krill was the staple food of the larger whales. The great whales of the Antarctic are now the subject of internationally agreed catch restrictions and some (notably the blue whale, Balaenoptera musculus) are protected altogether. Expert appraisals indicate that it will be several decades at least before the stocks of the large whales recover to the point where it is reasonable to crop them again and consequently they seem unlikely to be available as a resource within the time span of this survey. The smaller species of whale still being hunted in the southern ocean are not prolific in the area around South Georgia and the whaling stations in South Georgia are all at the present time closed down. There is a considerable conservationist feeling in the world against the exploitation of whales, partly because of the endangered status of some species and partly because the traditional methods of capture are regarded as repugnant.

The large squids of the Southern Ocean constitute the main part of the diet of sperm whales. Little is known about the behaviour, distribution and life cycles of these animals, but sustainable yield is estimated at 100 million tons a year or more. What proportion would be accessible from the Falkland Islands or the Dependencies is not known.

RESEARCH AND EXPLORATORY FISHING IN THE
FALKLAND ISLANDS, SOUTH GEORGIA AND ADJACENT WATERS

Falkland Island freshwaters

The fisheries of the Falkland Islands were examined in 1973 for FIG, by Dr Leslie Stewart. The principal conclusions of this investigation were:

1. No major source of income was likely to be derived from tourists coming to the islands for angling. The maximum number of tourist anglers the rivers could support for a 12-week season is about 24 and the maximum revenue likely to accrue from licences is about £5,000 per annum. Substantial difficulties would arise in providing transport and accommodation. Angling would therefore be only a minor and additional attraction within the context of a wider tourist industry (see Chapter 12).

2. Commercial netting and trapping of migratory trout in the estuaries and rivers is not recommended for the time being.

3. A controlled experiment for the introduction of salmon (Chinook, Quinnat or king salmon) in the Malo river should be undertaken if funds can be made available. This study should however be preceded by an examination of experience relating to the introduction of this species in New Zealand.

The recommended desk study of salmon introduction was also carried out by Dr Stewart in 1975. This study confirmed that introduction of salmon species was extremely difficult and too little was known at present of the environmental factors leading to success: none the less it was recommended that Quinnat salmon (Onchorhyncus tschawytscha) and pink salmon (Onchorhyncus gorbuscha) might be introduced experimentally to the Falkland Islands, the immature progeny of these species being obtained from North America. Introducing salmon not only would improve the tourist potential of the Islands but may be an elegant method of harvesting the apparently abundant stocks of small pelagic fishes, small crustaceans, squid and other species in the sea areas around the Falklands, where the growing salmon would feed, and thus converting these otherwise unprofitable organisms into a highly marketable product.

Seaweeds

The estimated current world supply of alginates, from the cropping of seaweed, is 20,000 tons per annum, about one-third of which is manufactured in Scotland by Alginate Industries Limited (AIL) which has been gaining an increasing share of the rapidly growing world market. World supplies of exploitable seaweed are relatively limited and there is thought to be little scope for cultivation. The nearest colloidial substitute is the gum from the locust bean which grows in mediterranean climates and takes 30 years from planting to the first crop and no synthetic substitutes are known to be under serious development. Demand is thus relatively inelastic and future prospects are good as soon as there is recovery from the world-wide recession, particularly in the food industry, the technology based sector of which is fast growing.

Alginate Industries Ltd, in conjunction with Kelco of the USA, the second largest producer, carried out a survey of the Falkland Island resources in the 1970s. A licence for the exclusive exploitation of the kelp resource in a defined area around the coast of East Falkland was obtained by Alginate Industries in 1972 at an annual fee[1] related to the tonnage harvested, but is not less than £2,500. The agreement concluded with the Falkland Islands Government also defined the time-table for development and options over additional resources. The sustainable yield of the Falklands resource was estimated at 1 million tons per year of wet weed which might yield up to 25,000 tons per year of final product, or somewhat more than the present total world production. The agreement, based on projections of world demand before the recent recession, provided for a minimum production of 4,000 tons per year of dried, milled weed (roughly the equivalent of 50,000 tons per year of wet harvested weed) by 1979, and double that amount by 1982.

The agreement has a five year duration, but is renewable, and subject to revision of the licence fee payable in accordance with an agreed price index, although it enables the Governor to revoke the licence should production fall below a minimum production level.

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1 The current licence fee is £1.90 per metric ton of dried milled kelp

Subsequent to the licence, AIL set up a pilot plant in the Islands, which successfully demonstrated the feasibility of producing alginate, despite gum that hampered processing but which was overcome by a washing treatment. On the basis of this pilot work, AIL would establish an operation involving the mechanical harvesting of kelp from the seaweed beds, its transport by the harvest craft to Stanley, washing, drying and milling at a plant in Stanley ready for shipment to AIL's factory in Scotland for the production of alginates. An initial capacity of 100,000 tons a year of wet kelp is envisaged which would result in 5,000 tons of washed, dried and milled kelp, in turn yielding about 2,500 tons of alginates. Drying would require about 1 ton of fuel oil for every ton of dried kelp and the plant would employ some 35 people most of whom could be Falkland Islanders. The capital cost of such an operation would be around £4 million in 1975 prices.

The additional washing process could raise processing costs above the level for most other seaweeds, while transport costs to Scotland clearly also affect the price levels needed to make a Falklands operation viable. However, the relative inelasticity of demand, the fact that alginates represent a very small part of final product prices, and the overall world supply situation in relation to rising demand all suggest that alginate prices will soon rise to a level which would make a Falkland supply operation commercially viable.

AIL has given consideration to carrying out final processing in the Falklands, but the weight of chemicals required is about the same as that of the dried milled weed. In addition the process requires energy and large supplies of fresh water; both of which would be expensive at current levels of development in the Falklands, and there is an absolute limitation on supplies of fresh water. Thus it appears there may be no economic advantage and possibly significant disadvantages in carrying out the chemical extraction in the Islands, although further investigation is merited.

The pilot plant in the Falklands is now on a care and maintenance basis as further development has been frustrated by the world recession and political uncertainty about the future of the Islands. Whilst ECGD political insurance cover would protect the Falkland Islands' investment, the related investment in down-stream factory capacity in Scotland might not be included. Meanwhile Californian production has recovered and

Alginate Industries have invested in operations to exploit small sources of supply in Tasmania and in Iceland (October 1975). The isolation of the Falkland Islands does not make them a preferred source of raw material and further development depends on economic factors and on the elimination of what the industry sees as political risks. Once started, however, production from the Falklands would probably increase relatively rapidly.

The kelp almost certainly plays an important part in the ecology of the littoral and sub-littoral, supporting species which may be potentially important economic resources, either in the field of tourism or fisheries. Scientific studies however have not been carried out.

Oceanographic and fisheries research

There has been a very large volume of general oceanographic and biological research in the areas of ocean around the Falkland Islands and South Georgia, especially the latter region, from 1920 onwards and much of it has been done by the British scientific teams employed by Discovery Investigations between 1923 and 1938. For much of this period two research ships were continuously at sea studying currents, water chemistry, oceanic plankton, and the food chains leading to the whales which were a particular object of study. Until very recently much of our knowledge of the very large stock of Antarctic krill was derived from these investigations, which also collected and identified many fish and inter alia revealed as early as the 1930s that the hake fishery on the continental shelf north of the Falklands was of potential economic value.

Notwithstanding all this work on the geographical distribution, life cycles and physiology of marine species, the estimates that fisheries biologists have been able to make of the standing biomass (that is the total weight of living animals) of most stocks and the potential sustainable annual yield that might be harvested are very tentative except for those resources, like whales and seals, that have been the basis of substantial commercial exploitation in the past. For other species, present estimates are based partly upon general considerations of biological productivity in the area,

partly upon inferences drawn from the present or past abundance of their natural predators, partly upon analogy with other similar areas of ocean, and partly upon the results of such exploratory commercial fishing activity as there has been in recent years. There is still a need for substantial basic research on the ecology of the Southern Ocean and its marine life to support the conservation and management of these resources. The scientific work of the last hundred years is likewise of very limited use in identifying the fishing gear and tactics best suited to commercial exploitation of those resources that seem to exist in sufficient abundance, or in deciding how best to handle and process them for the market. The technical feasibility of harvesting many species at economic cost has yet to be proved. Information is lacking for the design of fishing systems and for estimating likely costs and earnings.

Around the Falkland Islands and north of the Antarctic Convergence, Dr L Stewart, in his 1973 report, suggested that the fish potential should be fully exploited, and that an exploratory commercial fishing project to ascertain if the sea fish could be harvested to the mutual benefit of the Islands and Great Britain should be undertaken. There has been some exploratory fishing, for example by the British freezer trawler Boston Lincoln working for Brazilian interests in 1972. This ship fished 8 stations near the Falklands, but for a total of 5 hours only. Other exploratory fishing was carried out by the West German Weser in 1971/72 and again in 1975/76, as part of a research expendition; the Spanish trawler Mar del Vigo; an East German vessel; the Japanese Taiyo Maru No 82 in 1974 and Taiyo Maru No 85 in 1974/75.

Exploratory fishing with bottom trawls around the Falklands has led to considerable damage to gear from rough ground in certain areas but alternative methods of capture for demersal species exist and besides, not all species of potential interest are demersal. Moreover, other trawler captains have reported large areas of trawlable ground and the chief problem is probably to establish the kind of basic information already available for the northern hemisphere. Records of wind speeds suggest that sea states are perhaps not as rough as they can sometimes be in the northern North Sea, and fog is rare. Japanese commercial fishery interests have recently made enquiries about the coastal fishery resources of the

Falklands and one visit has been paid to the Islands to carry out a preliminary examination of the possibilities. Interest has also been expressed by Portuguese interests allied to a British fishing enterprise.

Much of the commercial exploration of the marine biological resources of the southern ocean since 1970 has, however, been south of the Antarctic Convergence. Soviet and Japanese state fisheries organisations have led in this work and hold a large proportion of the available information. Some commercial exploitation has been taking place: German reports indicate that Soviet fleets took about 350,000 tons of fish and krill in the western South Atlantic and southern ocean in six months in 1973 and Japanese ships not far short of the same amount. FAO statistics show that in recent years Russian catches off South Georgia have varied between 50,000 and 450,000 tons annually.

Russian research vessels (e.g Akademik Knipovich) have been active in the area for some years. In 1975/76 a West German expedition operated in the area, with the Weser and the research vessel Walther Herwig; British and French scientists were on board. Polish vessels have also been active recently. A good deal of experimental work on the harvesting and processing of krill has been done by these expeditions. British Antarctic Survey ships and scientists have collected samples of krill and fish and have undertaken research on these animals, mainly in shallow waters and from shore bases. The total amount of scientific knowledge is therefore increasing rapidly, linked as it is to commercially related explorations.

It has now been established that it is possible to locate krill swarms with considerable accuracy and catching rates of the order of 40 tons per hour have been achieved. The gear and tactics for catching krill and fish in commercial quantities are being established, but there are still major uncertainties over how best to process them for the market, and over the economics of the operation. Practically nothing is known about how to detect, capture and process oceanic squid which has so far escaped both scientific study and commercial investigation.

While the fishery activities in the ocean south of the Convergence are at the present time largely exploratory their scale is increasing year by year and it is quite evident that the potential of these very large resources is being taken seriously by many national commercial interests.

REQUIREMENTS FOR DEVELOPMENT

General considerations

In the discussion that follows, no detailed reference is made to the possible need for cooperation with Argentina in the development of offshore fisheries. However, it should be recognised that development on a cooperative basis may well be beneficial to the Falkland Islands. It would also yield benefits to Argentina.

The existence of a potential resource, however large, is not in itself a sufficient argument for a commercial investment in exploitation: in addition a market that will bear a price commensurate with production costs must exist. This is especially true of new fisheries based on less conventional types of fish which involve high financial as well as the customary physical risks. Consumer preferences are usually difficult to change and a considerable effort may be required to develop a market. Until this has been done and a price established for the product, estimates of earnings from a new fishery enterprise can only be very tentative.

The other factors controlling earnings are rates of catch and costs of production. These often depend on environmental factors over which man has little control. The rate of catch is a function of the size and type of vessel, the fishing gear and means of detection employed, and the knowledge and skills of the skipper and crew. Cost of production are governed partly by the rate of catch, but also by the methods of handling and processing the catch, the distance from the base port to the fishing grounds and the requirements of the market.

It would be possible to exploit most of the potential fisheries (except coastal fisheries) in the south west Atlantic by a variety of commercial systems:

- very long-distance ocean-going autonomous fleets of freezer trawlers or factory ships (as the Russians and Japanese do at the moment).

- fleets, based on the South American mainland, for example, of large stern trawlers;
- fleets, based in the Falklands and Dependencies, of moderate sized vessels.

In order to minimise production costs a primary aim of management is to maximise fishing vessel time spent on the fishing grounds. Thus it is desirable to operate from a base close to the fishing grounds, or else to provide sufficient hold space and employ methods of preservation on board that enable the vessel to remain on the fishing grounds a very long time and thus reduce the frequency of return to port. If operations are on a very large scale, it may become economic to provide a mother ship and associated transport vessels as an alternative or even a number of mother ships succeeding each other on the fishing grounds. However, particularly as management problems tend to increase with the distance of fisheries from centres of consumption, it is obviously cheaper to carry out the processing of the fish and the servicing of the catchers and crews in a shore base if there is a suitable one near enough.

Where there is a choice the smallest and simplest catching vessel is usually the most economic. For fishing around the Falklands, including the Burdwood Bank, and on the banks around South Georgia, vessels around 25 to 30 m length overall (LOA) would thus be suitable. From about 25m LOA upwards, weather tolerance does not increase markedly with size. A vessel of 25m can fish in Force 7 and a 75m shelter-deck stern trawler up to Force 9: the additional number of days fishing in a year does not compensate for the greatly increased vessel costs. Similarly catching power does not necessarily increase in proportion to length, displacement, propulsive power or numbers of crew. Thus the productivity, in terms of capital, manpower and running costs of the motor fishing vessels of the East Coast of the United Kingdom, Scandinavia and Pacific North West America is amongst the highest in the world. It is a common fallacy that large factory vessels and freezer trawlers are the most efficient; they may be necessary in certain circumstances but only because of the distances from the nearest ports to the fishing grounds, or for technical reasons. The largest shelter-deck stern trawler is therefore not the first choice for a fishery at a moderate distance - say up to 200 miles - from the nearest harbours, and would be less likely to be needed in the development of a Falkland Islands fishery. In contrast, larger factory vessels would be required for a krill fishery.

Constraints to development

There are six constraints to the development of fisheries in the area of the Falklands and further south and east: the lack of information on which to base investment appraisal; the lack of developed harbours and other infrastructure facilities; the lack of local skilled manpower; the lack of an organisation for the good management of the fisheries, coupled with uncertainty about rights of property in the resources; the scale of finance for the capital costs of development and costs of management and, for some potential species, the lack of developed markets. The first of these constraints has been considered in the review of resources above. The others are considered below, but it must be remembered, the extent and nature of the constraint depends upon the type of fishing system used.

Lack of information. The state of present knowledge has been reviewed in the previous section.

Harbours and other infrastructure. Lack of these facilities would represent the most serious constraint with use of fishing vessels of moderate size. Water depth of a fishing harbour needs to be in the range of 4 to 8 metres and might in some circumstances be governed by the draught of transport vessels used in shipping the product to an overseas market. Existing harbour facilities in the Falklands are largely confined to Stanley and although water depths are scarcely adequate at the present quays, these could be extended and Stanley would suffice, at a pinch, for a small fleet of moderate-sized vessels, relying on mainland ports for repairs and surveys. Moreover there are many sheltered harbours with deep water close inshore elsewhere in the Islands but without quay facilities, roads or manpower. These facilities at Stanley as well as these sites are described in Chapter 10.

Both social considerations and the, at present unknown, distribution of the best fishing grounds would affect the choice of fishing harbour or harbours in the Falklands. The importance of harbour location can, however, be illustrated by a hypothetical case. Taking Stanley (or Port William) and Port Albemarle as alternative harbours, and assuming fishing grounds at Beauchene Island and in the middle of the Burdwood Bank, with vessels of 25-35 m LOA making round trips of four days, using Stanley would result in

7 to 17 per cent less fishing time than Albemarle: for round trips of seven days, 4 to 8 per cent less. If a vessel's earnings were £100,000 pa, the penalty of using Stanley would be from £4,000 to £17,000 a year for each vessel. The alternatives would be to set up a fishing port at the more favourable location, and fly or drive crews and other workers home to Stanley for weekly and annual leave (as is done in Scotland) or else to set up a complete community at the fishing base. Taking all factors into consideration, Stanley would seem a less likely location.

There are, however, constraints on exploiting the fisheries around the Falklands by vessels of moderate size. It would be necessary to provide processing plants on shore as well as entrepot and servicing facilities. Cold stores on shore would be desirable in order to avoid the loss of fishing time while vessels waited for ships to transport the catch to markets and optimise the use of refrigerated ships. The freezing plant at Ajax Bay is not suitable for fishery products. Whilst the Murrel River near Stanley could substantially augment supplies of fresh water that would be needed for processing and ice-making, this could impose limitation on the scale of development.

The use of moderate-sized vessels would require, at the least, the establishment of dormitory facilities, though it is more likely that full residential facilities for crews and their families would be needed. The exploitation of the blue whiting by 30 m LOA vessels might require from five hundred to three or four thousand fishermen, representing a total fishery community of perhaps three to twenty thousand. If such a community were to be established in the Falklands, it would require a major development involving substantial Government investment.

Large stern trawlers would require an advanced operating base in the Falklands or South Georgia, or on the mainland, where they could refuel, take on stores and water, carry out minor repairs, exchange crews and transfer catches. Stanley could probably be developed as such a base.

In South Georgia, there are many excellent harbours and anchorages, particularly those at the four whaling stations, now disused, which supported the world's largest shore-based whaling industry from 1904 to 1965.

The solution that requires the least input from government - the ocean-going freezer trawler or factory ship - is probably the least economic in the longer term. It has the advantage of flexibility in that distant-water vessels can perhaps be more readily deployed elsewhere, but by the same token it is much less easily supervised, and good management of the fishery would therefore require a much stronger capability for inspection and arrest at sea.

However, if the fisheries of the area are to be developed to their full, estimated potential in the most efficient manner a fisheries harbour complex like that at Las Palmas de Gran Canaria is likely to be required, serving hundreds of fishing vessels and costing several millions of pounds.

All those involved in fisheries research and exploratory fishing, including international agencies and any commercial fishing enterprise subsequently established, would require quick and convenient travel to the Falklands. There would also be a need for rapid delivery of spare parts and equipment. These requirements imply the need for direct connections to the major inter-continental air routes, a service which an airport with a runway of only 1,250 metres is unlikely to provide. This problem is considered further under the Chapter on Transport and Communications below.

Manpower. There is no tradition of fisheries in the Falkland Islands and an almost complete lack of men skilled in fishing. There is little reserve of labour that could be trained. If a fishing industry of a size commensurate with the estimated potential of the off-shore resources were to be established in the Falkland Islands, it would require the immigration of fishermen together with supporting workers such as shipwrights, engineering tradesmen, fish processing workers and others. The scale of such immigration is indicated above, although some existing and possibly migrant Islanders would wish to seek employment in commercial fishing, which, in any case, is an occupation suited to younger men.

We are not optimistic that large numbers of good fishermen could be recruited for the Falklands from the British fishing fleets over the next few years: the industry is short of skilled young men and its prospects in United Kingdom waters are good in the longer term. It seems more likely that some country other than the United Kingdom may be a more prolific source of the necessary skilled manpower; Portuguese fishermen have been

employed in German trawlers for some years past, although senior officers and engineers are of German nationality.

In contrast, the size of community necessary to do no more than operate and support a system of licensing, management, surveillance and protection would be quite small.

Fisheries management and conservation. If the risks of over-investment, over-fishing, detrimental practices affecting the fish stocks and the commercial viability of the fisheries are to be minimised, an effective system of management must be established. Currently, no such system exists in the Falkland Islands or Dependencies.

The requirement is to monitor the state of the stocks; predict annual and sustainable yields; supervise methods of capture and fleet deployment so as to protect juvenile fish; maintain safety standards, conditions of service at sea, and quality of products; monitor pollution, control entry of additional vessels (of whatever nationality) to the fishery, and decide allocation of catches between vessels and fleets. Such control of the total fishing effort implies the licensing of fishing vessels. Effective management also requires means of collecting and analysing data of a scientific, technical and economic nature, and an ability to make predictions therefrom. Experience shows that if such work is not under way at the same time as commercial exploitation begins, the necessary knowledge and understanding will not be available in time to influence decisions on stock management and investment. Problems may well arise even if sound arrangements of this kind are made, but problems are well-nigh inevitable if they are not. Also implicit is a requirement for means of surveillance and inspection and a system of sanctions against offenders. Such functions can be undertaken only by governments, or by agencies with powers delegated by governments, and involve substantial cost but are essential if a state wishes to exercise any real influence over exploitation, or derive benefits in the longer term.

Assuming the off-shore fisheries to be of proven economic significance, it would thus be necessary to establish some regime unilaterally or by international agreement. The coastal states of the South American mainland already claim sovereignty extending 200 miles from their shores and whether

or not agreement is reached in the United Nations Law of the Sea Conference, many - including a majority of fishing interests - believe that a 200-mile fishing limit[1] should, or at any rate will, be generally adopted in the near future. In the meantime, however, this uncertainty in the rights of property must inhibit the establishment of a system of management.

Finance for fisheries development. Funds would be required for:

- exploratory fishing and investigations;
- provision of shore-based infrastructure;
- investment in fishing fleets and processing facilities;
- establishment and running of a fisheries protection and surveillance service.

In relation to the present financial resources of the Falklands and Dependencies, very substantial sums would be involved for each of the above items, funds which would have to come from elsewhere.

To some extent the type of fishing system will influence the sums required. Infrastructure investment would be less if the fisheries were prosecuted entirely by distant water fleets based on existing harbours, and needing only an advanced base or bases in the Falklands and Dependencies. Capital costs for ships vary widely with the fishery and according to the size and type of vessel and the product. The possible range is between about £25 and £500 or more for every ton per year caught. FAO and World Bank experience is that port facilities can cost up to as much again. The cost of the last item must clearly depend on the scale of the service provided which in turn will be influenced by the area to be covered, the number of licenced fishing vessels and the threats of unauthorised fishing or interference. The scope for licensing is considered in more detail below.

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1 The establishment of a 200-mile fishing limit would not necessarily imply active development by Government of the fisheries of the area and investment therein, either by way of infrastructure or commercial fishing. The coastal state could choose merely to share in the economic rent of the fishery through licence fees.

The most likely sources of the necessary finance for the first, second and fourth items are governments and international development agencies. Public sector finance may also be needed for investment in fishing fleets and in fish processing facilities, although considerable private sector finance is also likely to be forthcoming if the activities look commercially promising and risks do not appear too high.

It must be noted that, although some fishery products are highly saleable (e.g tuna, lobsters, prawns) and others are in good demand (e.g frozen blocks of white fish fillet, minces for manufacture of fish fingers, standard portions, or even fish meal), finance for new fishery enterprises is hard to find. Most are supported by governments in one way or another or are owned by state corporations. The likelihood of a new food fish industry being established anywhere in the world without government support or other aid is small, especially if unfamiliar species and long distances to markets are involved.

Licensing. Where national fishery limits extend far enough to cover the fishing grounds of interest, part or all of the costs of management and supervision may be recoverable in licence fees; the licensee pays for management of the fishery and thus for assurance that his investment is better protected than if the fishery were on the international high seas. What could be charged by way of licence fees depends upon the relationship between costs and earnings; the extent of vertical integration and organisation of the industry; and the nature of the market; all of which may vary greatly with the circumstances of the fishery.

For purposes of illustration, if fish used as raw material for the manufacture of animal feeding stuffs (fish meal) is sold ex-fishing vessel at £10 per ton a fishery yielding 1 million tons a year would provide £100,000 pa from licence fees if fixed at the rate of one per cent of gross fishing income. Fish utilised directly for human consumption may be worth ten times as much but earnings need to be high to cover the costs of carrying such fish products the long distance to markets. Experience elsewhere suggests that unless profits are unusually high, or else the operator of the fishing vessel shares in the profits from further processing, distribution and marketing, a licence fee corresponding to one per cent of

gross earnings is near the point of maximum acceptability. (The White Fish Authority levy on landings has in the past often been less and very seldom more than this figure). Good management of the fishery, including control of total number of vessels, should of course result in better profit margins, and much higher licence fees have then been found to be acceptable.

The effectiveness of licensing arrangements requires the provision of fishery protection, management and conservation services. It is difficult to envisage costs of less than £½ million a year for one effective patrol boat and a very modest scientific, technical, economic and administrative effort. 1 million tons a year is the estimated sustainable yield from blue whiting. It seems that this might not support a credible management system if exploited for fish meal, unless catch rates turn out to be very high in relation to costs, or the world price of fish meal again rises to £300 a ton or more. It may therefore be best to plan to develop the utilisation of this resource as food for human consumption, although initial exploitation for fish meal would still be necessary until fishing reduces the incidence of parasites. There are, of course, other resources that may have sustainable yields very much greater than that estimated for the blue whiting; the problem of covering the costs of management may therefore be soluble through fishing more than one species or looking for onshore economic benefits from Islands-based processing and handling activities.

Market development. For most of the species in greatest abundance - krill, squid, whiting - there is no substantial established market. Development of these fisheries would therefore require market investigations, processing trials, consumer testing and possibly considerable spending on advertising and market development. Even high quality fish such as the antarctic cod would need some expenditure on market development.

Possible benefits from development

The number of potential aquatic resources that could theoretically be commercially exploited, range in potential value from krill which could be a significant resource for mankind as a whole (c 100 million tons a year), to blue whiting which could be regionally significant (c 1 million tons a year), to trout which could be of local significance only. The potential

benefits from fisheries development therefore stem from the possibility of the commercially viable exploitation of these resources, resulting in generation of employment and income in the Falklands. Depending on the resultant scale and rate of population increase, fisheries development could well have a very marked and, possibly adverse, social impact on the Islands. Quantification of the benefits and social impact is not possible until exploratory fishing and possibly some pilot development work has been carried out.

The existence of substantial fishery resources off the western coasts of Britain, at present under-exploited, will undoubtedly raise questions of timing in relation to a positive commitment to develop the fisheries in the south west Atlantic. Nevertheless an active demonstration of British interest in the development and conservation of the fisheries of the Southern Ocean - which could be some of the biggest world resources of animal proteins - could make economic sense and provide the basis for a future cooperative approach to exploitation.

Stages of development

Insufficient is known about the aquatic resources (with perhaps the exception of kelp) to enable soundly-based investment decisions to be made at this time. Planning for exploitation of these resources should therefore be carefully phased so as to maintain a range of options at each stage from exploratory investigations, through pilot assessments to commercial exploitation, with research as a continuing activity throughout. Planning should also encourage interdependence in the development of resources: thus Falkland Islands coastal fisheries alone would be unlikely to sustain a processing plant (except perhaps for shellfish) but processing of coastal catches would become viable if use were made of plant primarily established for offshore resources. Each would enhance the commercial viability of the other.

Fisheries development in a new area generally involves three main stages, namely, research, exploratory fishing and pilot development.

Research. Before too many resources are committed to commercial development, research on the environment and on the ecology, distribution, biomass and population dynamics of species of potential commercial value must be begun. Reliable estimates of sustainable yield and the total fishing effort that should be allowed and hence of the total investment cannot be made until after commercial exploitation is under way. Our present meagre knowledge of these matters has been reviewed above. The organisations operating oceanographic and fisheries research vessels have the special skills needed to conduct resource surveys of this kind and they should be closely involved in the early stages of investigation.

Exploratory fishing. In order to make responsible appraisals of proposals for investment in a new fishery it is necessary to carry out practical, pilot-scale, trials taking the form of a reconnaissance in space and time by a fishing vessel or vessels.

Few research ships, even those attached to research organisations directly concerned with commercial fisheries, are equipped, skippered, manned and operated in such a way as to make them suitable for carrying out this type of work. Instead, commercial vessels with skippers and crews who are skilled, experienced and versatile commercial fishermen should be employed. The vessel or vessels should be of the type believed likely to be most suitable and equipped to handle full-scale commercial fishing gear. They should be worked at commercial intensity to process and bring back catches for subsequent examination and test marketing.

Charter by government will often be the only practicable means of obtaining such vessels, since the risk of loss of earnings, and the direct operating costs involved in experimental fisheries are too great for most owners. A freezer trawler on charter may cost £2,000 a day, and one of the larger motor fishing vessels of the so-called "inshore" fleet may earn £500 to £1,000 a day at sea and charter costs would need to be commensurate. To cover the areas of interest around the Falklands would require many ship-months.

Pilot development. If the research and exploration fishing indicate good prospects for commercial fishing, the next stage is pilot development preceded by a feasibility study to determine the type of commercial fishing systems most likely to be suitable, the processing and infrastructure

requirements, the socio-economic impact and the programme for pilot development. Separate marketing investigations may also be necessary.

Once commercial scale fishing has commenced it is then necessary to try and predict the optimum number of vessels that should be engaged in exploiting the fishery at the maximum sustainable yield, and to determine the required scale of provision of support facilities. If this is not done, over-investment and over-fishing are likely. It will be apparent that provision for regulating the number of ships (of all nations) and permissible catches needs to be made if waste and damage to the resource is to be avoided.

Pilot development for a Falklands Fishery. The prosecution of fisheries development in the Falklands is complicated by two factors. Firstly, the absence of a local market means that fishing must be mainly for export. Secondly, provision of the necessary resources of manpower and equipment would require deliberate importation and also the deliberate establishment of the shore facilities. Unfortunately, there is little scope for minimising the extent of unknown and unforeseeable risks in fisheries development by reducing the initial scale of operations to a part-time enterprise or to one full-time boat; below a certain scale of operation, the chances of success will be reduced and operations will tend to be uneconomic. Financial support through temporary subsidies to offset the diseconomies of small scale will not counterbalance operational ineffectiveness.

A method of fishing that may prove attractive is two-boat midwater trawling, in which the fishing unit is two motor fishing vessels. In certain circumstances five boats may work together, so that one is delivering the catch while the other two pairs continue fishing. Five vessels provide some statistical assurance against total accidental breakdown, sufficient capacity to allow for surveys and overhauls to be carried out, and perhaps most important, a reasonably rapid rate of build-up of fishing intelligence.

For industrial fishing (i.e. fishing for fish meal) to be financially attractive for vessels of this type at present prices, each would need to catch 10,000 tons a year, or say 200 tons a week. A fish meal plant capable of processing 1,000 tons a week on a 20-hour day is big enough to begin to be competitive; anything much smaller would not. Initially, average catch rates would probably be lower, and the fish meal plant would work fewer shifts.

For a fishery for human consumption to be similarly financially attractive, a large motor fishing vessel would need to catch 1,000 to 2,000 tons a year, so that a fleet of five would require a processing plant capable of handling at least fifteen tons a day of raw material on a single shift, or, say, a freezing plant with a throughput of one ton per hour, assuming the fish would be filleted. This again is a reasonably competitive size of plant. In addition, harbour facilities, stores, offices, etc, would have to be provided, together with housing and other amenities for some fifty to one hundred fishermen and workers.

Finance for pilot scale development

The sums likely to be required to enable demonstration of the commercial feasibility of an offshore industry based on the Falklands would be:

	£ m
Vessels	1
Processing plant etc.	½ to 1
Guarantee of income for two years and costs of travel to participants	1 to 2
Housing, harbour works etc.	2
Total = say	£6 m

The foregoing indicates our opinion as to the minimum viable scale of investment whether by government or private enterprise or both for a pilot scale development using motor fishing vessels based on the Falklands. Some of the capital expenditure would have a continuing or resale value and the guarantee element might not be fully used. It is not to be construed as our recommendation as to what should be done. That can only be determined after research and experimental fishing and market investigations.

Such an enterprise would, in addition, be entitled to other support from Government. This support would need to include some statistical services, surveillance capability and an element of protection, all of which would add to the cost of the pilot-scale enterprises. A fisheries protection vessel could be equipped to acquire intelligence and provide other support at costs less than that of a ship of war. Other nations operate fishery protection vessels and support ships of this kind. Against the estimated potential, all these services would cost relatively little.

It would be worth making provision for trying two or more different sorts of enterprise, not necessarily simultaneously: motor vessels and big stern trawlers; fish meal and fish for human consumption; coastal and offshore; fish and krill.

The foregoing applies primarily to offshore fisheries. For planning purposes it is assumed that coastal fisheries (based on mullet, herring) will not be commercially viable except in close collaboration with an offshore industry based on blue whiting and hake. Use could be made of the same vessels and the same pilot processing plant.

It is clear that a substantial injection of public money would be required to assess the feasibility of commercial offshore fisheries in the area and to facilitate their establishment, whether on the mainland or in the Falklands and Dependencies. The amount required would be less if the fisheries were prosecuted entirely by distant water fleets based on existing harbours.

The estimates indicate that the resources in this region are potentially so important that it is predictable that all these options will eventually be explored. The question is, rather, whether British Government or Industry will set aside the funds necessary, or leave it to somebody else.

Developments around South Georgia

The krill and fish south of the Antarctic Convergence form by far the largest potential resource within the area of this study. As indicated above Russian and Japanese fleets have been engaged in commercial fishing, based on conventional species, periodically during the last ten years. There is little doubt about the availability of Notothenia as a basis for a fishery, but basic biological data on which to decide about the viable size of such an industry is lacking. The krill resource is potentially ten or more times the size of the ordinary fish resource. Whether ships equipped to process krill will also be equipped to process fish remains to be seen; another possibility is that, in the off-season, they will be used to exploit meso-pelagic stocks in other areas of the world ocean.

Despite experimental krill exploitation by the Russians, Japanese, West Germans and Poles, it is still not certain that the resources can be exploited commercially. While it is now clear that krill swarms can be detected at short range, fished and processed into various products, a market has still to be found and developed which gives an adequate return on the costs of production. If and when this problem is overcome it would be wise to assume that krill fishing will expand very rapidly. It is argued below that this potentially rapid expansion is the most important factor to be taken into account in deciding on a British development policy for krill.

There is no lack of interest in krill in other countries. It seems probable that relatively conventional gear can be used and that the build up of activity after a market is found for the product could be rapid. The outcome could show remarkable parallels with the development of whaling. After the first stern slip factory ship appeared in the Antarctic in 1925-1926 inaugurating pelagic whaling, the industry boomed. By 1930-31 there were so many whaling expeditions (47) and catchers (232) that there was over-production of whale products, the market collapsed and all but 7 whaling expeditions, with 45 catchers, were laid up for the 1931-32 season. The over-investment in the industry led to continuous whaling in later years at catch rates above the maximum sustainable yield.

Even if the UK fishing industry does not have an immediate interest in the resources south of the Convergence in the south west Atlantic, they do have an interest in ensuring that the resource has not been over-exploited by the time they wish to enter it. The key to ensuring a future share of these resources lies in urgently developing multilateral management and conservation regulations for the resource. The past history of British research in this area carried out by Discovery Investigations, and the possession of South Georgia, would give the UK a seat at an international conference called to negotiate such regulations but the lack of specific present research programmes on krill would leave the British delegates with a voice of relatively minor importance.

CHAPTER 8 - MINERAL RESOURCES

INTRODUCTION

The first two sections of this chapter describe the known and potential mineral resources both on and offshore the Falkland Islands and the political, economic and environmental considerations which govern their commercial exploitation. Conclusions have been drawn where possible. The last main section is concerned with providing a description of the different phases and options of operation involved in offshore oil (and natural gas) exploration and production, and considers how, in the event of this ever taking place, the Islands might be affected in social, economic and environmental terms.

ONSHORE

No major geological survey of the Falkland Islands has been undertaken since 1920-22 when Baker carried out his study. He established the stratigraphical succession and published the first official report and geological map in 1924. In recent years geologists of British Antarctic Survey have briefly studied certain aspects of the geology (Joyce, 1950; Adie, 1952; Ashley, 1961; Mansfield, 1965; Brown, 1967) but no further systematic work was undertaken until a full photogeological interpretation was carried out in 1970-1971 by Ms M.E. Greenway under the supervision of Dr R.J. Adie (Dep. Director of BAS and Hon. Reader in Geological Sciences, Birmingham University). Thus the following comments should be read in the knowledge that no definite conclusions can be drawn until a more thorough geological survey has been carried out.

Metals

At various times searches for mineral deposits have been undertaken in the Falklands without success. Baker's view in 1924 was that there was little prospect of there being any metallic minerals or coal to develop. The existence of rare metals such as yttrium being deposited in denuded rocks such as the Cape Meredeth Complex has raised some interest but the geological history of the deposit and disappointing results to date in more recent petrographic work by C.G. Smith (BAS 1969/70) in trying to locate concentrations in some of the younger formations, would indicate that economic deposits are unlikely.

Mineral oil

As far as oil and natural gas are concerned, the only areas of interest are the Lafonian sandstone and shale sediments of East Falkland. Though those rocks could be potentially oil or gas bearing, compared with offshore areas, the thicknesses of the sediments are poor; and given the horizontal layering of the rocks, the prospects for suitable structural traps for hydrocarbon deposits cannot be considered very great. R.J. Adie points out in the Greenway photogeology report of the Falklands, that extensive drilling in the Karoo sediments of South Africa, which bear striking structural and stratigraphic similarities to those of Lafonia, has yielded no significant hydrocarbon deposits.

Peat

The abundance of peat in West and East Falkland, sometimes up to 5 metres thick, is one of the main features of the Islands and of the social and economic life of its inhabitants. In the larger settlements of the Islands, the nearby peat bogs have been exhausted. New excavations in Stanley are now up to 5 miles away, and in Darwin/Goose Green they are 10 miles from the settlement. The economic implications of this are discussed in Chapter 10 dealing with fuel supplies. Although of good calorific value Falkland's peat is too acidic and of too low an ash content to be of horticultural value. The use of Falkland Island peat as a source for extraction of Montan wax for carbon paper and polishes is ruled out by the constraint of its distance from the main consumer markets which are in any case unlikely to grow; moreover, the wax is found in greater concentrations in lignite, a form of soft brown coal.

Silica sands

The fine white quartz sands found on several different beaches of the Falkland Islands were analysed both by Baker (1924) and more recently in 1950 for their suitability in the manufacture of optical glass. In general it was found that the sands, though of good grinding and granular quality, contained too high concentrations of iron oxide and alumina. The sands would therefore require probably uneconomic pre-treatment.

Rock aggregates

The whole of West Falkland and the northern half of East Falkland (including Stanley) are essentially made up of terrestial sandstones of the Devono-Carboniferous ages. As a result they are particularly hard and the landscape is characterised by their craggy outcrops, resistant to erosion. It follows therefore that blasting and crushing rock for the purpose of making road aggregates would be very laborious and expensive in many areas; such is the experience of the airport constructors. The younger rocks south of the Wickham Heights and the Lafonian Supergroup contain softer sandstones, shales and slate which could be extracted relatively inexpensively for road construction.

OFFSHORE

The offshore area for which mineral exploitation is controlled by the existing Mineral Oil Ordinance, extends to the 200 metre isobath. However, as will be discussed more fully in Chapter 19 of the report dealing with the licensing of oil exploration and production, not only is the current Ordinance to be revised but the whole question of jurisdiction over offshore areas is subject to current discussion on the draft articles of the Law of the Sea Conference, and of course the sovereignty claim of Argentina. So far as the discussion of offshore hydrocarbon potential in this section is concerned, for the sake of clear understanding, it can be taken as the continental shelf area extending to a median line between the coasts of Argentina and the Falklands and to the 200 mile limit in other directions.

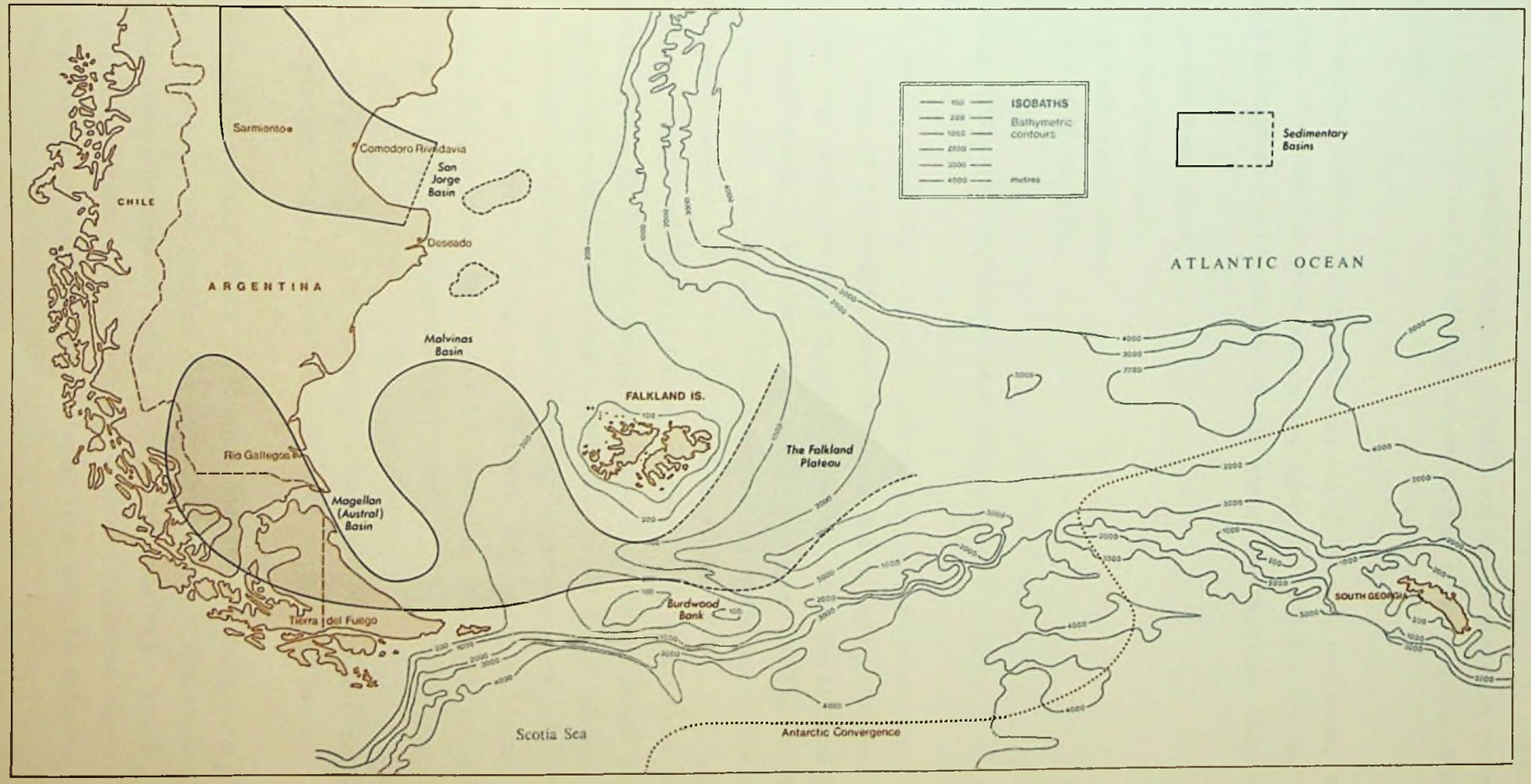
Hydrocarbon prospects

The following description of the geology of the area and its potential hydrocarbon bearing prospects is based largely on the conclusions of Professor Griffiths and his Birmingham University team in their 1975 report on The Geology of the Region around the Falkland Islands. In addition discussions were held with geologists and geophysicists from oil companies, consultancies and with Sir Peter Kent, chairman of the Natural Environmental Research Council and former chief geologist with BP, who also wrote a critique of the Griffiths report.

Since the completion of the Griffiths report some of the single channel seismic reflection data produced from the 1973-74 RRS Shackleton survey has been six-fold computer processed. This is generally of medium to poor quality as a result of bad weather, hydrophone failure, varying ship speeds and seismic penetration, the reverberation experienced and the lack of velocity depth determination. There was the further difficulty of having to digitalise analog recorded seismic data, and because of lack of funds only about half the data has been processed. It was, however, the potentially more interesting reflection lines which were selected for processing. In spite of these difficulties the geological picture of the area, after initial interpretation of the data, has become somewhat clearer and confirmed much of the Griffiths team findings in their 1975 report. It must be stressed that the data has only received cursory examination and

Figure 6

PROBABLE SEDIMENTARY BASINS AND BATHYMETRY OF THE SOUTH WEST ATLANTIC (Based on current knowledge)



would certainly benefit from further study and interpretation by experienced geophysicists. It is arguable whether further expensive computer processing is justified in view of what is already known of the areas and the expense of the exercise.

Fig 6 indicates the offshore areas of the Falkland Islands and shows the four main areas of potential hydrocarbon sediments in relation to the mainland oil and gas producing basins of San Jorge and Magellan (Austral):

1. The Malvinas Basin.
2. The Burdwood Bank.
3. The Falkland Plateau.
4. The San Jorge Basin.

The map also indicates the offshore water depths.

It is argued by the Griffiths team that the geology of the area can be considered in terms of a southern section of the South American Cordillera which has been bent eastwards by geophysical forces, this Cordillera having a western mountain range (the Andes, truncated south east of Cape Horn), a deep trough immediately to the east with potentially hydrocarbon bearing sedimentary basins beyond. Thus the Malvinas basin is believed to be an extension of the Magellan (Austral) basin, which currently produces both oil and natural gas. It is also thought to extend to the Burdwood Bank, though the adjoining neck to this basin would appear to be of rather thinner and narrower sediments. More recent interpretation of the YPF offshore seismic and drilling programme of 1968-1971, using oil companies under contract, has generally confirmed the Magellan (Austral) and the Malvinas basins to be a single sedimentary block.

The Falkland Plateau to the east, although probably containing some of the same aged sedimentary rocks, is overlayed by much younger sediments.

Malvinas Basin. This basin offers the most promising offshore area for hydrocarbon discovery. The gravity and processed seismic reflection data revealed sedimentary thicknesses going up to 3.5 kilometres - which is comparable with many areas of the North Sea - before thinning out to about 0.6-0.8 kilometres on approaching the Burdwood Bank and the Islands

themselves. Also, as in the case of the North Sea, it would appear that the sediment thicknesses are greatest adjacent to the median line between the Falkland Islands and Argentina. Most of this sedimentary area has not experienced deep burial which tends to favour gas rather than oil formation. This phenomenon is exhibited in the Magellan basin, where there is a high proportion of natural gas production in the producing fields, and the oil fields have high gas: oil ratios. The other main prerequisite for hydrocarbon accumulation besides the existence of suitable sedimentary rocks, is the presence of hard rock capping of some kind so as to prevent the escape of any oil or gas formed. The processed data indicated some dipping of sediments to the west and indications that anticlinal structural traps may be present. Based on the geology of the area, the much less easily detectable stratigraphic traps caused through faulting and deformation, may also occur, though there is no clearly defined fault line as in the northern North Sea (the Viking graben). Water depths in the basin vary from about 150-200 metres in the northern section, which is about the same as that of the Magnus field discovery in the northern North Sea. Further south water depths of the basin rise to 300-370 metres.

Burdwood Bank. This area, separated from the Islands by the Falkland Trough which intrudes from the east, proved to be acoustically opaque to reflection surveying. Griffiths argued that this opacity, indicating deformation of the sediments and high basement rock, could arise from north thrusting of the pre-Cordilleran zone and seriously reduces the chance of hydrocarbon discovery in this area. The limited six-fold computer processing of the two reflection lines data which run over the western drop of the Burdwood Bank confirms this finding, and it would seem that the Bank is a broader extension of the deformed zone running north from Isla de Los Estados, at the eastern tip of Tierra del Fuego. This must certainly be viewed as a disappointment since this area is considered by many oil companies as potentally the most attractive.

Falklands Plateau. Seismic work undertaken by the PC16-06 (Lamont -Doherty Geological Observatory Survey 1973) and that of the Glomar Challenger (Deep Sea Drilling Project 1974), which also drilled three cores, revealed the presence of younger sediments containing immature hydrocarbons above the Cretaceous and Jurassic shales, but of thicknesses (about 1 kilometre)

which are insufficient to allow sizeable deposits. However no final conclusions on this area can be drawn until a more detailed survey is carried out.

San Jorge Basin. When Argentina embarked on its 1968-1971 offshore exploration campaign, it concentrated on what it believed would be the seaward extension of the San Jorge basin. Drilling revealed that this offshore portion is relatively limited and the only prospects in the open sea are two very small sub-basins(See Figure 6).

Finally, it must be stressed that the seismic work to date can only be considered as a preliminary survey (it certainly does not approach the coverage that has taken place in the offshore areas of the Austral (Magellan) basin). Many more reflection lines would be required to delineate sediment thicknesses the size of the basins, as well as to try and locate the possible presence of structural traps, particularly, in the northern section of the Malvinas Basin.

Weather/Oceanographic environment

The reputation of the weather and sea conditions of this area of the south Atlantic ocean is generally worse than the reality. However, as statistics of wind speeds and direction in Tables 44 and 45 below clearly demonstrate, conditions must be considered hostile and there are certain features which will add considerably to the difficulty of any offshore oil operations in this area.

Wind. Insufficient data has been gathered to be very specific about wind speeds and directions in the Malvinas Basin, Burdwood Bank and Falkland Plateau areas, though reasonable extrapolations can probably be made from the data assembled at the Stanley Meteorological Station.

Table 44. Mean Weather Conditions 1968-70 at Port Stanley

	Jan	April	July	Oct
Mean Temp ^{o}C	8.8	5.9	2.2	5.2
Mean wind speed mph	16.0	15.6	16.2	17.3

Source: Stanley Meteorological Office.

As will also be shown in Table 45 overleaf there is little variation year round in weather conditions. Based on evidence from the Admiralty Pilot and local knowledge, one can probably add 3-5 mph in average wind speeds for the Malvinas Basin and the Falkland Plateau, and perhaps 7-9 mph on the Burdwood Bank.

Table 45. Wind Directions/Forces at Port Stanley
(% of time)

	January					April				
	SW	W	NW	Other	Total	SW	W	NW	Other	Total
Force 1-3	3	4	8	9	24	3	5	13	7	28
4-5	10	9	15	18	52	10	11	18	11	50
6-7	7	4	4	6	21	6	3	2	7	18
8+	1	-	-	1	2	2	-	-	1	3
Total	21	17	27	34	99	21	19	33	26	99
	July					October				
	SW	W	NW	Other	Total	SW	W	NW	Other	Total
Force 1-3	3	6	12	7	28	2	3	7	7	19
4-5	9	9	17	15	50	10	9	20	10	49
6-7	4	3	4	8	19	8	5	8	7	28
8+	1	-	-	1	2	2	-	-	1	3
Total	17	18	32	31	99	23	17	35	25	99

Source: Based on Stanley Meteorological Office data.

It is interesting to note that winds are strongest in September/October i.e. spring time, and least in April i.e. autumn.

The predominance of the north westerly air stream at Force 5 and less is very marked, though the highest proportion of strong winds in excess of Force 6 is from the south west and the north east. A feature of the area is the quickness with which wind direction and speed can vary, and gales at sea can be violent and unpredictable. Forecasting is certainly a hazardous occupation in this part of the world even if current methods were to be supplemented with weather satellite photographs. And again it should be remembered that, for offshore conditions, the percentage distribution of wind speeds in Table 45 should be shifted so as to produce a 3-7 per cent higher distribution at strengths of Force 6 and greater.

Sea conditions . There is a paucity of accurate oceanographic data for these offshore areas, and although the US Navy Oceanographic Statistics claim to be based on over 3,000 recordings for the Malvinas Basin area, certain of their observations do not seem to correspond with local knowledge of these seas, nor with what might be predicted from the relative position of the South American continent and the prevailing winds. This is particularly the case in the emphasis the US statistics place upon the occurrence of long seas and swells.

It is generally estimated that wave heights in excess of 3 metres exist for 15 to 20 per cent of the time in the West Falklands area, and some 5 per cent more on the Burdwood Bank. If anything it is less severe than the northern North Sea in this respect, and waves over 10 metres are less frequent. Contrary to the US Navy reports, the rougher seas are short because of the suddenness of storms and the quickly shifting wind directions. Fetch distances to the west and water depths are insufficient to make for long swells. The Burdwood Bank does experience large swells as well as short steep seas by virtue of being more exposed to the weather of the Drake Passage, south of Cape Horn. The greatest problem for offshore operations would be the lack of predictable weather windows which, when they occur, tend to be short. Conversely, it is also true that storms do not last as long as in the northern North Sea and the seas quickly flatten out again because of the sweeping effect of the Falkland Current travelling north.

The presence of icebergs being swept up as far as the River Plate is reported in the Admiralty Pilot. However in most years icebergs are rarely seen in the latitude of the Falklands, particularly west of the Islands. There are occasional summers when the ice flow is exceptionally large calling for special alert. The bergs would be of the small glacier variety rather than the large tabular type.

Commercial potential

Before going on to attempt to assess the prospects both in terms of the local parameters of production potential and cost as well as the future development of world oil economics, it is essential to recognise the full implications of the political environment.

Political environment. It appears to us very unlikely that any exploration programme can be embarked upon in the offshore Falklands area without the agreement and cooperation of Argentina. Indeed it is doubtful in the extreme that an oil company would accept a unilateral offer of exploration/production licenses by the Falkland Islands government without firm assurance that this was also acceptable to the Argentine. Not only is the exploration/production expenditure too high to undertake political risks but the logistics of an exercise that avoided Argentina would probably be economically unattractive.

Should Argentina be prepared to enter into some form of cooperation (the offshore exploration programme of YPF about to get under way in the Austral Basin might in fact increase the argument for economic cooperation, if the results of that programme in 2 or 3 years time indicate that the Falklands side of the Malvinas Basin to be of particularly high hydrocarbon bearing potential). It is also important to recognise the nationalistic policy that Argentina has previously held with regard to the development of its oil resources. Its history of invitations to oil companies and subsequent dismissals and takeovers may deter some, particularly the larger American multinationals.[1] Moreover, oil exploitation policy in Argentina has hitherto allowed for no share in production for oil companies, merely a contract drilling arrangement. This question will be discussed at greater length in Appendix 4 of the report.

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1 From the policy statement by the new Argentinian government, it would appear that attitudes to foreign participation in exploration/production may be more liberal.

Production potential and costs. It is impossible to make any forecast of oil or natural gas production without first having some idea of reserves and field sizes.[1]

At least two years' seismic work and 2 or 3 years or so of exploration drilling with not less than 5 drilling rigs would be required before any rough estimates of reserves and field size could be made. Knowledge of the area will improve once the results of the new YPF drilling campaign of the Austral Basin, due to get underway this year, are known. Nevertheless mention can be made of certain aspects of the problem.

First there is the cost factor. Offshore exploration in these kinds of conditions and distances from the mainland would be an enormously expensive venture. Each well drilled would cost over £1 million. On the production side, it is probable that the larger hydrocarbon accumulations in the Malvinas Basin, if they exist, would occur where the sedimentary thicknesses are greatest. It would appear from the Griffiths data that this occurs in 180-200 metre water depths. Although no oil or natural gas field in the northern North Sea in these water depths has received firm production plans, the technology exists for its development and BP is currently assessing the relative advantages of fixed platform versus sub-sea completion/floating structure methods of production for its Magnus field find. Then there is the question of whether to lay a pipeline or install an offshore loading spar system. Many factors affect this choice including weather, field size and water depths. But whichever might be selected, the transportation factor can represent up to 20 per cent of total amortised capital and operation cost, this itself being anything from $4.5 to $7 per barrel (1975 costs) produced for the northern North Sea fields so far declared commercial. For equivalent sized fields in the Malvinas Basin 1975 costs could be anything up to 25 per cent higher.

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1 It is worth commenting on the figure of 200 billion barrels (nearly 6 x total North Sea estimated oil reserves and about 9 x proven North Sea reserves) which was produced as an estimate of offshore Argentinian reserves in a US Geological Survey bulletin last year. This figure is based on a series of enormous hypothetical assumptions and is likely to have little credence amongst geologists. It compares the area of continental shelf of the US east coast with that of Argentina, introduces a further multiplier according to the difference in sedimentary thicknesses (which are considerably exaggerated), the whole calculation being founded on a high estimate for the US offshore reserves. No mention of geology is made in the entire article.

Secondly, there is the future world price of oil to be considered, or more particularly the relative movement of price to exploration and production costs. The price today of Arabian Light crude landed on the Argentinian mainland would be just over $12 per barrel, so that even at today's costs and prices, field reserves would need to be capable of supporting a peak production of at least 150 thousand barrels/day, assuming average royalty and government tax take. None of the Magellan Basin oil fields surpasses even half this figure and currently only four oil fields in the UK sector of the North Sea are capable of it.

Looking into the future, it is assumed that OPEC will continue as an effective oil pricing cartel over the next 5 years, though its solidarity will be severely strained, particularly towards the latter end of the decade as oil production from other areas of the world outstrips increased oil requirements. However, it is probable that in real terms the price of oil will continue to fall, especially against production costs, until perhaps post 1982/83 when the pendulum could begin to swing the other way again, always assuming world economic growth is maintained. At the same time, it is generally not the view of the oil industry that quantum leaps in offshore engineering technology will markedly bring down the real cost of production over the same time period. On the whole, sub-sea well-head completions are seen as a means of operating more economically than fixed platforms in deeper waters and hostile weather conditions, not as a cheaper replacement for them in water depths up to 150 metres or so. Against this background over the next 10 years it can be seen that an oil find in this area will if anything need to be capable of exceeding 150 thousand barrels/day production to be commercially exploitable.

Conclusion. From the foregoing, it can be concluded that any oil company, whether private or state controlled, embarking on an exploration programme in the eastern Malvinas Basin will have a rather sober view of the potential commercial gains. Other offshore areas of the world still to be explored, such as parts of the US east cost, Egypt, the South China Sea and even offshore Alaska, would probably be considered better commercial prospects. The commercial attractiveness of the area is further diminished

by the possibility that natural gas rather than oil might be discovered. With no large domestic market, this hydrocarbon could well be prohibitively expensive to liquefy and transport as LNG. Very large quantities indeed would have to be found to make this a viable project. However, there is no doubt that if political obstacles were removed and exploration blocks were leased/licensed, there would be a response from oil companies, assuming the terms offered were not unreasonable. Denmark recently was quite successful in licensing large concessions off south western Greenland, with relatively tough terms for such a formidable virgin area.

OFFSHORE OIL EXPLORATION AND PRODUCTION - OPERATION AND IMPACT

The purpose of this section is to describe relatively briefly the various phases involved in offshore oil exploration and production in terms of timing, the physical operation, the different options open and the likelihood of the Falkland Islands being involved with any of the stages, assuming of course that exploration licences were offered and taken up. Under the main headings of exploration and production, the economic, social and environmental impact of these developments, in so far as they could affect the Falkland Islands, are then evaluated.

Offshore exploration

Description of operation. As mentioned earlier in the Chapter, the first phase of exploration off the Falkland Islands would be an intensive geophysical survey of the areas of interest. This would be undertaken by ship(s) similar to the RRS Shackleton in type, and would take two to three years. The Islands would only be affected in so far as the survey ship(s) might put into Stanley from time to time for stores. This could provide a very few jobs for supply personnel.

If the results of the seismic survey justified it, an offshore drilling programme would then commence. This could take anything from 3 to 10 years, depending upon the intensity of effort and the success of the venture. In these offshore areas, exploration drilling would be carried out either by dynamically positioned drill ships or semi-submersible rigs, the main difference being that the former are larger and tend to be more self sufficient. They have an operating crew of about 120 (3 shifts x 40) but in the normal course of events the crew would not live in or be expected to be recruited from the Islands. The crews would be flown on and off by long range helicopter from the mainland, or possibly via Stanley, depending on the position of the rig. Drilling rigs have to be provided with a continual supply of drill pipe, cement, drilling mud, chemicals, tools and engineering equipment, water, fuel, as well as the normal ship provisions. This role would be performed by large 2,000 ton supply boats - an exploration drilling rig requiring about 12 visits per month from these boats.

From an economic point of view it is considered unlikely that such a base would be set up in the Falklands as:

1. the Argentinian mainland already has a large oil town in Comodoro and is likely to set up another base further south for servicing the Austral Basin exploration;
2. a base on the Islands would mean double handling of most materials - everything would first have to be brought in by sea, through this would to some extent be true for a mainland base also;
3. there is a ready source of labour on the mainland and the Argentine would point to the greater level of unemployment there;
4. the base, if it were located in the Falklands, would not be located at Stanley and so would have no back-up infrastructure and services.

However, if exploration activity were concentrated on the Falklands side of the Malvinas Basin (less than 100 miles) and the number of drilling rigs operating was sufficiently great, the economic arguments for locating a base in the Falklands could become overriding - the cost of diesel fuel would be an important element of the equation. If so desired, the licence terms could require the Falklands to be used for service base activities.

An advance supply base of the kind operated by Norscott at Lerwick in the Shetlands could be constructed, though it is unlikely that a Falklands supply base would be as large and probably would not possess an engineering shop. The Norscott base is operated under service contracts to oil companies, though the companies sometimes set up their own facilities.

The base is essentially a deepwater quay with at least two deep water (25 ft draft) berths and 1-2 acres of open area so as to allow a mobile crane (25-50 tons) an operating radius of 50 ft. In addition 10-15 acres of open storage and warehouse space would be required. If the offshore activity were production well drilling as opposed to exploration drilling, the operations would almost certainly be scaled up and storage doubled: it is possible an engineering shop might then be established.

There are several potential harbours in West Falkland that would readily provide deep water all-weather berths for supply boats; for example, West Arm near Albemarle, and Gull and Chatham harbours on Weddell Island.

Economic and social impact. If there were to be a joint exploration with Argentina of the offshore areas, this in itself would almost certainly carry many subsidiary effects in terms of increased communication and trade in areas other than oil. However, the first most tangible effect of offshore exploration would be the increase in Government staff in the Islands necessary to administer the development - the Department of Energy could provide a source of experienced staff. This would mostly be required to cover licence applications, concession administration and, even though this activity might have its headquarters on the mainland, a great deal of liaison work with the Falklands Government would be necessary. Improved air communications, some increased hotel accommodation and banking facilities would be essential in the event of joint offshore exploration.

Increased Government expenditure would therefore be inevitable, some of which could be in the form of a grant or loan for improving private sector services. The question of whether the Falkland Islands Government received any increased revenue for this exercise would depend upon the form of cooperation and exploration licensing agreement, but it is by no means assured. This is discussed further in Section 3, Chapter 19 dealing with oil licensing policy.

In the event that an advance supply base was set up in West Falkland, it is probable that, after the construction phase was over (involving a temporary work force of about 50 or so), a permanent work force on site of about 30 would be required plus another 10 or so involved in back-up logistics, communications and service functions in Stanley. Of the total some 3 or 4 would be in management/administration, 3-5 typists/clerks/telephonists, and the rest would be base operators of various skills. It should be noted this number does not include the supply boat crews, who would probably not be resident in the Falklands - this has certainly been the experience in Shetland and north east Scotland outside Aberdeen. Theoretically a majority of the base operators and office staff could be Falkland Islanders, though it is interesting to note that by the end of 1974 only 25 per cent of the workforce of Shetland Island service bases were Shetlanders.

With the setting up of an advance supply base, the following would tend to accompany the development:

a. building of temporary accommodation at the base, or nearby settlement;
b. internal air service link to Stanley and airfield;
c. expansion of port authority and customs.

Part, but not all, of this would be self-financing. As well as tax revenue some rates - say £6-8,000/year - could be extracted from the development.

Overall it can be said that the exploration phase of any offshore development would have limited and fairly temporary socio/economic impact on the Falklands, mostly concentrated in the need for improved services and communications. It would exert relatively little labour drag in the Camp, certainly less than the airfield construction. It would be the Stanley service industries, if any, that would be affected by any supply base development. At this stage it is impossible to state from the point of view of timing or location whether such a development could be integrated with that of a potential future fisheries development.

Environmental impact. With the very marked advance in well blow-out prevention equipment that has taken place since the 1960s, offshore oil and gas exploration drilling now presents a minimal oil pollution threat. A very intensive exploration programme in the North Sea has witnessed no serious oil leak and only one gas escape of any significance. Nevertheless it would be necessary to ensure that standards and safety procedures are at the least on a par with those operating in the North Sea.

Offshore oil production/transportation

We hesitate to embark upon a description of the operation and probable impact of a development whose realisation seems such a remote possibility in the next ten years, if at all. Its justification lies in the magnitude of the changes and the far reaching implications of developments associated with any production taking place in the Falkland Islands.

Description of operation. An oil (or gas) field is declared commercially exploitable once sufficient appraisal drilling following an initial discovery has confirmed the field size. This exercise could take anything up to 18 months from the day of initial discovery. If it was an oil field that was considered to be commercial[1] it could be evacuated in one of three ways:

i. by laying a pipeline to a loading terminal on the Argentinian mainland;
ii. by laying a pipeline to a loading terminal on the Falklands;
iii. by loading offshore, using a loading spar and an exposed location mooring buoy.

The choice would not only be determined by the relative capital cost of the three different options - which in turn would depend on technology available, water depth, distance from shore etc. - but also on the running cost and convenience of the operation. For the same arguments as those against locating a supply base on the Falkland Islands, an oil loading terminal would suffer even more in comparison to the mainland because of the much larger size of the project. Item (iii) would require a very large fixed platform/storage system to be installed at the well head. If an underwater pipeline were laid to the Falklands (at a cost of well over £1 million/mile), a suitably sandy landfall would be required, from where the oil would be piped overland to the crude oil storage and loading terminal. Here the oil would be stabilised by having the light gases, essentially LPG, stripped out and the oil stored before loading into tankers. Depending on destination, these tankers could theoretically range up to 300,000 tons in size. It is more probable that smaller vessels in the 80-200,000 ton range would be used since the bulk of any oil produced from this area would find its way to the nearby South American market. However a loading terminal site should have:

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1 On the Falklands side of the Malvinas Basin it is very improbable that a natural gas field would be considered commercial because of the colossal expense, on top of that of piping it to land, of liquefying and shipping the gas to a market.

1. harbour and manoeuvring area of turning circle diameter of not less than 400 metres;
2. navigational safety from the point of view of tides, currents, winds etc;
3. shelters from prevailing winds;
4. close proximity of tug berthing and a reasonably level land area of 60-100 acres;
5 the possibility of confining accidental oil spills;
6. reasonable fresh water supply.

Chatham Harbour is one of two or three possible sites in West Falkland but of course more detailed surveys would be required before any decision could be made. The site would contain 4-7 storage tanks of about 100,000 tons capacity each, water separation plant, gas stripping towers, settling tanks for bunker washings, loading jetty, powerhouse and administration buildings. It is possible that, if the quantities of gas stripped out were large enough, an LPG (propane/butane) separation plant might be justified. It should also be remembered that berths would be required for dry cargo vessels and small tankers during the construction phase, as well as for tugs, mooring boats and a harbourmaster's launch.

Assuming that the throughput of the terminal was 200 thousand barrels/day or 10 million tons/year (i.e. large enough to justify commercial production of one field), such a terminal would handle about 70-100 tanker movements per year i.e. an average of one every 3-5 days.

The direct employment requirements of a crude oil loading terminal are related to the level of throughput, plus the associated facilities and the location. For a 10 million ton/year throughput, this could be about 60-70 men (BP's Angle Bay terminal for their Llandarcy refinery employs 40); to this should be added the labour force required for the power station, sewerage facilities, tugs, pilots, harbour control, etc, totalling a further 160 or so, giving a minimum total direct workforce of around 230. Doubling the throughput would increase this to about 350, and an LPG plant, if it were built, could employ a further 100 or so people.

An oil refinery or petrochemical plant can probably be ruled out on the grounds that they are too far from the market, to be economically viable. Although an ammonia plant based on natural gas feedstock is not excluded on these grounds (there is a ready market for liquid ammonia in South America), it seems very unlikely, since Argentina and Chile are both flaring natural gas from their Tierra del Fuego fields, as it is. Also an ammonia plant on its own requires insufficient natural gas to justify the laying of a natural gas pipeline to the Islands. So far as the Falkland Island farms are concerned it would make more economic sense to supply potential future nitrogenous fertiliser needs[1], which would be very small relative to plant size, with imports subsidised from oil revenues, rather than to build an ammonia plant, and particularly a downstream fertiliser plant, whose output would be geared almost entirely to export.

In total therefore, the direct employment created by building an oil terminal with those associated facilities which could be economically justified would lie somewhere in the 300-500 range, including the supply base.

Economic and social impact. First, it should be made clear that the Falkland Islands, in the event of a commercial offshore oil discovery, would not in any forseeable future become the location for any fixed steel or concrete platform construction.

It is probable that, if offshore oil production were ever to take place in the Malvinas Basin, the Islands would only be directly involved to the extent of being the location for a branch of its administration and the possible site for an advance supply base in the development drilling stage. In which case, the most significant economic result would be the receipt of revenue. On the hypothetical assumption of a 25 per cent return on capital investment, a production of 200 thousand barrels a day, and a decline in the real price of oil relative to production costs to $10.50 per barrel, the revenues accruing at peak production could be in the order of £100-£200 million per annum. So even if a proportion of revenue as low as 5 per cent was allocated to the Islands it would create an annual income expressed as GDP per caput of around £7-12,000, which is about twice that of Kuwait (£4,000 per caput). This amount of money could not be managed by the

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1 As discussed in Chapter 16, the response of Falkland Islands' soil to nitrogenous fertilisers is limited.

Islands' Exchequer, and even channelling the income into a development fund which could at the same time distribute dividends to the Islands' current account, could create enormous internal strains in the Islands' economy. A flood of revenues into the economy would soon lead to inflation and inequalities from which the community would suffer. Thus revenue would need to be very carefully managed so that the real benefits that would accrue from increased Government expenditure in various sectors of the economy are not overshadowed by the undesirable effect of a sudden increase in money supply.

But a problem of a far greater kind would confront the Falkland Islands if a crude oil loading terminal were to be built somewhere in the West Falklands. It is difficult to be at all precise about the resultant increase in population that would follow this development but the job multiplier effect to be applied to the directly created oil jobs would be very much larger than 1.3 to 1.5 range generally experienced from oil developments in north east Scotland and Milford Haven in Wales. This arises because of the complete current lack of services and infrastructure. Though by no means all the oil-related employees would bring families or necessarily even make their home in the Falklands, a majority would be expected to do so. In effect a new town would have to be created with all the necessary accompanying public services, roads, education and health facilities etc. In addition it would be necessary to expand radically the communications with the airport and with Stanley. One could perhaps with more justification say it would be necessary to facilitate travel from Stanley to the new town, since there would undoubtedly be attractions in the newer and larger town which Stanley does not possess. Altogether it is by no means inconceivable that the multiplier jobs would be at least as many as the directly oil related working population. When families have been taken into account, an additional population somewhere in the region of 1,500-2,500 could well be created. By immigration control it should be possible to prevent a flow of 'fortune seekers' and general itinerant population from increasing this figure still further. This influx would almost certainly be of mixed nationality, and since cooperation with Argentina is a prerequisite for oil exploration and development, it would be reasonable to expect that a good number would be YPF personnel, other Argentinians and Chileans.

Of course before this stage was reached, a construction phase of 3 to 5 years would have to be undergone, with a peak labour force of around 1,500 which would have to be temporarily housed and supported. The current social and economic impact of Johnston's airfield construction workforce would prove to have been almost mild by comparison.

It is almost superfluous to point out the strains that such a development would place upon the existing social and economic life of the community, even allowing for the fact that it may be located at a relatively far distance from Stanley and Camp settlements. As has been experienced in Shetland after only a relatively short period, the service and retail industries would be denuded of labour because of the earnings differentials created by both the temporary and permanent oil-related workforce. The Falkland Islands Company and the farms would also be bound to suffer from further labour drift over a period of time.

Undoubtedly measures could be taken to minimise this impact by attempts to control development through compulsory purchase of land and strict planning laws, through equity participation by the Island Government in operating companies and through the establishment of a 'disturbance' fund contributed to by oil companies. The parallel with the Shetland situation, however, is limited; while the Shetland has more supply bases and is building a larger oil terminal than would ever be likely for the Falklands, Shetland has a residual population of over 17,000, with its capital town Lerwick containing about 6,000. Shetland also has a more stable social structure with a much higher degree of self-dependence in terms of owner occupancy and self-employment.

In conclusion, it would appear rather unlikely that the agriculturally based economy of the Falkland Islands could remain at anything like its present size in the face of such a development and the question arises as to how far it can shrink before its viability is in doubt. The existing social pattern and expectations of the Islanders would be bound to change, and it is doubtful whether the change would be of a kind that would continue to support a remote agricultural way of life.

Environmental impact. Though actual operating experience in the northern North Sea is still very limited, it is generally accepted that oil production could be carried out safely in most offshore areas of the Falkland Islands employing existing technology. Where water depths are in excess of 250 metres, and taking sea conditions into account, more experience needs to be gained before a similar claim can be made. However, because of the great natural wealth of the marine and littoral zones of the Falkland Islands, it would be essential that all proper precautions and safety measures were enforced by regular inspection of production platforms by the appropriate authority. It should be recognised that there is a remote iceberg hazard, particularly east of the Falklands but this can be coped with by special alert in years when the ice flow is exceptional. Tugs/supply boats would be capable of towing them away from potential collision courses. Mention should also be made of the protective effect of the Falkland Current which, in the unlikely event of an oil spill at the platform, would carry the oil spill northwards away from the Islands, before swinging eastwards out into the Atlantic.

There is reason for more concern about an oil loading terminal operation. The main potential hazard arises from any spill during the jetty loading operation and improper discharge of ballast water. Once again there is no reason why, with proper controls and water pollution monitoring procedures, this cannot be carried out safely. In the event of a spill in harbour it is relatively simple to contain by towing a floating boom across the harbour mouth. Clearly a harbour would not be selected if it contained or was adjacent to a large penguin rookery, for example, or seal colony.

There are now many public bodies and conservation groups e.g. Institute of Terrestial Ecology, Nature Conservancy Council, Royal Society for the Protection of Birds etc., who are familiar with the site selection problems and the operation of crude oil terminals in the UK and who are represented on the control authorities of many of these terminals. They would have an important role to play alongside natural scientists with proper local knowledge, in the event that an oil terminal were to be located in West Falkland.

CHAPTER 9 - INDUSTRY AND CRAFTS

INTRODUCTION

Currently, crafts are the only secondary economic activity, this sector being relatively undeveloped in the Islands. In the past, there has been some industrial activity, namely, mutton canning, pre-world war I at Goose Green, and mutton freezing at Ajax Bay in the early 1950's. Recently there have also been some pilot plant trials of seaweed drying and milling in connection with development of alginates.

Crafts

As yet crafts have not been organised on a full-time basis. Many people both in Camp and in Stanley indulge in handicrafts as an evening or part-time recreational activity. Knitting, leather work, woodwork, and wool spinning are the most common, and particularly practised in winter. In a number of cases, levels of skills are high, but the motive is primarily enjoyment or own-use of the resultant object, rather than pecuniary.

Of unusual interest is leatherwork or gear-making, which involves the use of raw hide to make horse-riding equipment (or "gear"), including saddles often involving intricate designs. With the advent of the landrover, a reduction in horse-riding, and a general decline in interest, the number of skilled gear makers is now very small.

Falkland Islands Home Industries

The Falkland Islands Home Industries, run by the Guild of Spinning and Handicrafts, is the only organisation which coordinates craft activities and sells handicrafts. It operates from a rent free building in Stanley, supplying materials to guild members and marketing their produce, mainly to tourists, in return for a fixed payment for work done. At the beginning of 1976 there were some 14 knitters (8 in the Camp and 6 in Stanley), 12 spinners and six others undertaking a range of crafts including hornwork, jewellery, shell ornaments, paintings and whole fleece production. All work is part-time. In recent years annual turnover has varied, ranging

from £400 to £900, the profit to the guild being about 20 per cent of turnover. Knitwear - jerseys, sweaters, hats etc. - is the main item, but one of the major constraints is the lack of locally spun wool. Many more women knit for their own family use, but it is not known how many would be interested in expanding their production on a guaranteed output basis, and in making garments according to a co-ordinated design policy.

DEVELOPMENT OF INDUSTRY AND CRAFTS

Future possibilities

All industrial development in the Islands tends to be constrained by the:

- very small local market;
- distance and infrequency of transport to most export markets;
- undeveloped local transport network, particularly the lack of roads;
- lack of specialist knowledge and expertise;
- absence of surplus manpower.

Such industrial opportunities as exist must be based on economically exploitable resources on, or close to, the Islands, or the use of by-products and waste-products of the existing farming system.

Because of the constraints, possibilities fall into two categories. Firstly, there are those activities where it is only feasible, for technical or economic reasons, to produce or market on a medium or large-scale. Secondly, there are those which lend themselves to small-scale production and marketing. Industrial possibilities in the former category are likely to need to be at least medium-scaled, capital-intensive operations capable of being competitive on the world's export markets. Possibilities in the second category are likely to be in the nature of cottage industries or craft activities capable of flourishing on the local domestic or tourist market.

In the short to medium-term, the possibilities are limited. A number are listed below but exclude those specifically related to fisheries or exploitation of seaweeds (covered in Chapter 7).

Meat freezing

Currently, under half the sheep slaughtered on the Islands are used for human consumption. Over a five year period, 1970/71 to 1974/75, some 116,000 sheep were slaughtered for mutton, another 117,000 for export as

skins and 8,000 used for various other purposes. The rest of the meat is wasted, being destroyed on the farms and left to manure the ground or be eaten by the abundant wildlife. Utilisation of this waste meat represents the most obvious major industrial opportunity, but any future development must take account of the past failures of the cannery and the Ajax Bay Freezer. The latter, a Commonwealth Development Corporation enterprise which operated from 1953-55, failed mainly because of heavy under-utilisation arising from inadequate transport for carcasses. The scale of the plant was too large in relation to the potential supply, and the low levels of actual supplies to the enterprise from the farm companies. Should a viable mutton freezing operation be established, changes in the Falkland Island flock structure would be a natural concomitant, involving slaughter of animals at around 4-5 years of age rather than 6-7 years, upgrading the quality and increasing the returns from the sale of meat. This would result in an increase in the number of animals available for slaughter each year, and from a farming point of view, would increase the proportion of farm income from meat from a negligible level.

However, major constraints exist to any such freezer development. These include:

- given the maximum potential number of carcases, technically and economically, there would need to be one freezer, in a suitable location, and central slaughtering;
- in the absence of roads, transport of live sheep to the freezer would need to be mainly by ship. This could prove costly if provision of additional shipping was required only for a short period of the year;
- the majority of animals would come forward during the summer and autumn. This would create serious peaking problems which could only be overcome by building a plant large enough to cope with peak flow or holding stock and feeding (and fattening) animals on a supplementary diet;
- insufficient labour for droving and delivery of animals because of conflict with shearing requirements;

- transport of frozen carcases to markets is likely to be infrequent and therefore investment in storage capacity would be substantial;
- export markets for mutton, as opposed to lamb, are very limited in number and scale;
- the slaughter operation would require meat inspection to the generally required high standards of the meat trade if access is to be gained to markets in EEC, US and Japan; the meat inspection staff and other skilled slaughter line staff are likely to be under-employed.

A technically feasible operation would comprise a small flexible slaughter line capable of handling 20 to 100 carcasses per hour, supported by chilling and freezing facilities, and arrangements to ship carcasses at periodic intervals by refrigerated containers carried on a cargo vessel.[1] Live animals for slaughter would need to be delivered on the hoof to the slaughter line, by lorry over track or road, by Coastal Shipping's coastal vessel or by farm-owned sea transport.

Such a line, on one-shift working, could cope with up to double the likely annual off-take of animals from a flock of the present size and structure, assuming most of the animals were slaughtered in a 5-6 month period. Capital costs would be of the order of £300,000-400,000, including plant to convert by-products into fertiliser. Some use might, however, be possible of plant from the Ajax Bay freezer.

It seems improbable that a freezing enterprise would be commercially viable without improvements in the Islands' transport infrastructure. Moreover, as part of any feasibility study, investigations would have to be carried out on potential markets, on the scope for sale to, or use of, storage facilities at a South American mainland cold store, and into the scope for financial involvement of the Islands' farms.

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1 It might be possible to arrange for a feeder service to an Argentinian or Chilean cold store and onward shipment to Northern markets.

Clearly, another possibility would be to add meat as a subsidiary activity to a freezer established primarily to handle fish for export, or to develop a joint meat/fish freezing operation. There need be no technical difficulties given appropriate design. However, depending on the type and behaviour patterns of the fish being exported, the main catch season could coincide with the period for sheep sales, aggravating rather than ameliorating a peaking problem. Whether this problem would exist, and therefore the scope for a joint operation, cannot be resolved until exploratory fishing and catch development work has been undertaken.

It is thought unlikely that the breeding, slaughtering and freezing of Upland geese, as and adjunct to mutton freezing, would be an economic proposition.

2. Canning

Canning is more capital intensive and subject to greater economies of scale than meat freezing. A suitable plant would cost in excess of £1 million, but the canning operation would tend to be under-utilised. It is considered that canning of mutton, whether for the human or pet food markets would not be commercially viable.

The distance from markets (and a source of tin plated steel) would be a particularly constraining factor in the development of an economically viable canning industry.

3. Wool scouring

Scouring of wool in the Islands is technically feasible, and is superficially attractive, as it would increase the value-added from raw wool production accruing to the Falklands. Scouring requires ample water (one gallon per pound of greasy wool), a site convenient for collection of wool from farms and export of the scoured wool, supplies of detergent and fuel oil (or other energy source) for steam production. A plant of minimum size, comprising one 4 ft set, would require about 10 employees and involve a capital investment[1], including working capital, of £400,000-£500,000. The most obvious site is on or near the Murrell River, near Stanley, drawing water from the Murrell.

1 Assuming purchase of new equipment, although a secondhand set may be available and would be much cheaper.

There are a number of economic and technical obstacles to establishing such an operation:

- highly skilled and specialised sorting is required before scouring. An Islands-based team would be underutilized and would almost certainly lack the skill of the present sorters (who have undergone five years apprentice training). Flying out the existing sorters for part of the year would be expensive and almost certainly not acceptable to the employees.
- blending with wools of other characteristics, qualities and origins is important to meet market needs and maximise prices: this is best done in a greasy state and by a unit in close contact with the market.
- only part of the clip (about 2/3 to 3/4) is suitable for scouring, the rest would have to be shipped out in the greasy state for combing abroad. The minimum scale of this operation is much larger than scouring. The scourable part of the clip would only keep one set occupied on a 40 hour week (compared with 120-168 hours in industrial countries) for 32-35 weeks in a year. The plant would therefore be heavily under-utilised and would almost certainly be unprofitable.
- relatively frequent but irregular replacements of major parts of a scouring set are normal and therefore stockholding costs for spares would be high.
- costly additional handling of wool or removal of the port operation from FIC's jetty in Stanley to a new location in Port William, near the scouring plant, would be necessary.

For the above reasons we conclude that establishment of a scouring operation would not be commercially viable and would not bring any net economic benefit to the Islands.

4. Sheep skin pickling.

Skins[1] are exported either dried or wet-salted. In the former state, the yield is about 20p per kilo, whereas from a skin pickling operation the wool (or slipes) would sell at around 75p per kilo (end 1975 prices) and

1 The annual average over the last nine years is 140,000 kg but the amount fell to about half the average in 1973 and 1974.

the pickled skin at 25p per kilo. Skin-pickling is in fact the first stage in the process of tanning and involves immersion in lime baths to separate the wool from the skin whilst preserving the latter. It can be carried out on a relatively small scale at the slaughter house or on the farm[1] at any time of the year. Since the operation could be carried out in winter at times of slack labour demand, there appears to be scope for development of a few units on the Islands where there is adequate water and good access to a number of neighbouring farms.

5. Sheepskin processing.

Sheepskin processing to produce cured whole fleeces for sale as floor rugs or chair covers can be carried out as a cottage industry. A one-man unit, purchasing selected skins from the slaughter house, could produce 500-700 skins a year. Machinery and equipment requirements would involve an investment of £5,000-6,000. There would be scope for sales of good quality rugs to tourists and possibly for export. Assuming sales at from £7 to £12 each, depending on skin size, and purchase of raw skins at from £1 to £2, the annual return should be in the range of £2,000 to £3,000. Training would be essential for a successful operation; this could be obtained through an institution such as the National Leather-Sellers College in London.

It is considered that the scale of operation needed for a tannery would be too large to justify one on the Islands.

6. Knitwear production

Development. Any expansion of knitwear production is dependent upon a number of factors:

a. Market. The present market is limited to the trade in Stanley, most of which arises from the tourist ships arriving in the summer months. This market could, and should expand, along with that of

1 As in New Zealand or Scotland. Sometimes, together with the sale of the skin the activity is known as 'fell-mongering'.

tourism itself. However, if a knitwear industry is ever going to contribute substantially to the Islands' economy, export markets would have to be developed, for example in the UK, USA and South America. Arrangements for shipping would be needed, as would reliable marketing agents to secure customers, manage the orders and shipments, and report on fashion changes.

b. Design. In recent years the market for knitwear has been dramatically affected by competition from the Far East manufacturers of Hong Kong,Taiwan, and Korea whose labour costs are substantially lower than those of producers in the developed countries. This competition has even seriously affected the demand for high quality products such as Shetland knitwear. Any industry based on the Falklands could only develop therefore with a distinctive design theme or themes (such as the Fair Isle Pattern), production of high quality garments and a hand-finished appearance (whether or not in fact hand knitted or from hand operated machines). Good design, sensitive to fashion changes[1] - style and colour in particular - would be of critical importance.

c. Skilled manpower. The knitting industry could expand based on full or part-time knitters, provided there is sufficient commitment. But acquisition of the necessary skills is essential. These, whether hand knitting or operating knitting machines, could best be taught at a central workshop in Stanley, which would also serve as a place for storage of yarn, and finished garments, for the supervised finishing (joining) of knitted pieces and for packing of garments. The necessary design skills could only be acquired through training overseas of suitable personnel, or by bringing an appropriate designer to the Islands to stimulate the development of distinctive design patterns.

d. Organisation. One advantage of this industry, is that it can be started on a small scale and does not have to be too centralised.

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1 Fashion does affect traditional knitwear sales. Currently "ethnic" knits are in vogue and there is no doubt scope for sale, at very high prices, of hand-spun, home dyed, hand knitted garments to exclusive designs.

Much of the knitting can be undertaken in the home, as is the case in the Shetland and Faroes knitwear industries, though a central coordinating, finishing and packing office would be needed. One of the functions of such a central office would be to arrange the supply of yarn from hand spinners, from suppliers abroad or (if ever established) from a local spinning mill. At the beginning, this office would employ at maximum 2 or 3 people. Though it is not essential for a small knitwear industry to be mechanised (small Faroese companies have no knitting machines), especially at the outset, production can be increased four or five times through the use of hand knitting machines which can be installed in the home. Power driven machines are unlikely to be suited to or justified in the Falklands. New industrial-type hand knitting machines now cost around £1,100, excluding freight costs but domestic machines at around £300 would also be suitable, but not so long lasting. Machines of both kinds can be purchased secondhand.

While home knitting is likely to form an important part of a knitwear industry and also provide useful job opportunities for Camp womenfolk, the creation of a central knitting workshop in Stanley would be desirable to create new jobs for school leavers.

For a successful knitwear industry to be established in the Falklands, it would be essential for there to be a sufficient sustained commitment from local knitters. In order to support a central finishing, packing and despatching office, as well as a marketing function, it would probably need to employ the equivalent of 15-20 full time knitters - some using machines. At this level of operation a knitwear industry could bring an additional £50,000-£75,000 in value to the Islands' economy.

7. Wool spinning

Wool spinning is an operation which attracts considerable economies of scale up to an optimum level of production which exceeds the Islands' output of suitable wool. In view of this, and the earlier conclusion over

scouring (see page 200), spinning is seen as feasible only on a small scale basis to supply a local knitwear industry; competitive export of spun yarn is out of the question. However, there is considerable doubt as to whether such small scale enterprise could ever be commercially viable. Today the smallest machine spinning operation (washing, drying, carding, dyeing and spinning), using new machinery, would have an output of 40-50 kg an hour and the machinery cost alone would be some £70,000-80,000. Capacity would exceed local demand, at least for some years to come, resulting in underutilisation of the plant.

However, purchase of a smaller scale secondhand mill may be possible. The Gotu mill in the Faroes had an output of around 30-40 kg/day, when established in 1961. This level of operation would employ about 5 people in the washing and spinning process and the output would keep about 4-5 hand-knitting machines fully employed. The capital cost could be of the order of £12,000-£15,000 plus the building. On this basis, the ex-mill prices which would need to be charged to achieve profitable operation could well make imported yarn a cheaper proposition. In the Faroes, three spinning mills are currently operating, but there is none in Shetland. Although Shetland has a larger knitwear industry, more sophisticated washing, spinning and dyeing of its wool is required than in the Faroes and it is more economic to import from the mainland.

For the forseeable future, even if a suitable secondhand plant could be purchased, it seems unlikely that a spinning operation would prove to be viable in the Falklands. However, such a venture should not be totally discounted if knitwear production expands markedly.

8. Weaving

Hand-loom weaving of exclusive garments for the tourist market or for export is clearly feasible. It would need to be based on imported yarns and therefore the only locational advantage of the Islands for such an operation would be to supply a local market, including tourists. High

quality and successful design would be important both to secure sales and prices substantially above those for mass-produced articles. Weaving of garments competing with the latter is unlikely to form a basis for viable operation. Skilled weaving and garment finishing would also be important. Weaving could be on as small a scale as one weaver/designer supplying to the Falkland Islands Home Industries, but a small group is likely to be more successful.

9. Crafts for tourist sales

Various hand-made products are already sold to tourists principally through Falkland Islands Home Industries (see above under Crafts).

Even with the present small scale of tourism, there is scope for increasing sales through widening the range of products and improving their design. New product possibilities are numerous, but could include:

- leatherwork or 'gear' souvenirs, e.g. whips;
- lithoprints of wild life paintings;
- colour slides and prints of wild life;
- wood carvings or models using wood from wrecked ships.

Conclusions

In view of the marketing, transport and manpower constraints, the immediate prospects for industry and crafts are limited to mainly small-scale developments in sheepskin pickling, knitwear production, weaving, sheepskin rug manufacture and handicrafts for the souvenir market. Local tourists (see Chapter 12), would probably form a major outlet for many of these industries particularly in the initial years of establishment though it would be essential for most of these potential industries to develop export markets in the longer term. This applies particularly to knitwear production. Mutton freezing, to be successfully established, would need to overcome several constraints in the present organisation of agriculture and in the local transport links.

Except for mutton freezing, the prospects for which cannot be seen as very strong, most of these developments would be relatively small scale and, if successful, would not have a major impact on the economy of the Falklands. Nevertheless they would create valuable diversification of full and part-time employment, particularly for women, as well as adding to the income of the Islands.

Before any of the more export oriented ventures were embarked upon, and we would identify knitwear production as the one with the most advantageous combination of reasonable prospects together with potential social and economic benefits, further feasibility study would be needed. This would be essential to:

i. identify capital and operating costs more accurately;
ii. establish potential availability and commitment of the worforce;
iii. assess marketing constraints;
iv. estimate potential gross returns.

CHAPTER 10 - TRANSPORT AND COMMUNICATIONS

TRANSPORT

The existing transport network

The existing transport network within the Islands, and the links with the outside world are described in Table 46 overleaf. A number of features of the transport network emerge from this table.

i. the external passenger service is limited to the air service provided by the Argentinian state airline, LADE;
ii. the regular external freight service is provided by the Falkland Islands Company;
iii. the Falkland Islands Government role is confined to the operation of the internal air service.

Each of the services is described below.

External Air Service

LADE. The Argentine State Air Line (LADE) runs a weekly service using F27 turbo-prop aircraft between Comodoro Rivadavia (in Patagonia) and Stanley. Pending completion of the permanent airfield at Cape Pembroke (some 4 miles east of Stanley), which is being financed by UK Government grant, the aircraft land on a temporary airstrip provided by the Argentine Government. This airstrip, which is made from aluminium strips, is now being extended for safety reasons by 300 metres to 1,100 metres. This regular service was inaugurated in November 1972 following Agreements[1] between the UK and Argentine Governments. In accordance with the Agreements, LADE operates a sales office in Stanley and, in return for providing the service, was granted a number of concessions granting exemptions from rates, customs duties, and accounting control (under Companies Acts). The air service is understood to have run at a loss to date and therefore, in effect, has been subsidised by the Argentine Government.

1 These are the Communication Agreement or Joint Statement of 5.8.71 and subsequent Agreements of 2.5.72 and 24.10.72 on the temporary airstrip and provision of the regular air service, respectively.

Table 46. Falkland Islands Transport Network, 1975

Mode	Ownership of vehicles	Passengers	Carriage of: Freight	Fuel	Mail
External					
LADE air service to and from Comodoro Rividivia	LADE	x	x		x
Charter cargo ship to and from UK	Darwin Shipping Ltd*		x	x	x
Naval vessels to and from UK*2	MOD			x	x
Internal					
FIG Aviation Service	FIG	x	x		x
Coastal Shipping Service	Coastal Shipping Ltd*3		x	x	x
Other small ships - "schooners"	FIC and other farms	x	x	x	
Roads and camp tracks	Private	x	x		

* Wholly-owned subsidiary of FIC. *2 Occasional and very limited service, mainly HMS Endurance, Ice Patrol Vessel, and RFA tankers. *3 FIC managed. The present carrier makes occasional trips to the South American mainland.

Source: EIU.

Details of passenger movements are given in Table 47 below.

Table 47. LADE Air Service, Passenger Movements*, 1973-75

	1973	1974	1975
Tourists	200	501	350
Business	158	182	582
Resident	420	472	416
Transit	5	15	31
Dependants	-	-	13
Total	783	1,170	1,392

* Based on arrivals in Stanley.

Source: FIG.

Whilst total passenger movements in 1974 and 1975 averaged only 23 and 25 per week respectively, it is noteworthy that these substantially exceeded the forecasts in the Falklands Island Transportation Study[1]. It is in fact often necessary for more than one flight a week to carry the passenger load.

1 Carried out in 1970/71 by Peat, Marwick and Mitchell and which recommended establishment of the LADE Service. Actual movements in 1975 exceeded the 1980 forecast by about 70 per cent.

The LADE air service has had several effects on the Islands. The most important has been that achieved through increasing the frequency of contact with the outside world from monthly to weekly, thereby significantly reducing the sense of isolation. It has also made possible more numerous and frequent tourist and business visits. However, the service is perceived by the majority of Falkland Islanders as having introduced a degree of dependence on Argentina. Furthermore the requirement[1] for all Falkland Islanders to obtain and hold an Argentinian "white card" to enter their own territory is widely regarded as a source of irritation. The "white card" was introduced as part of the Communications Agreement and is legally applicable to residents of Argentina and the Falkland Islands. It original purpose was to facilitate travel through Argentina to the Falkland Islands. In practice, the process of obtaining the temporary card at Buenos Aires causes frequent delays for incoming visitors. For Argentinians the delay is often reported to be at least 3 months; for non-Argentinians normally 48 hours, although there have been occasions of over a week's delay.

Permanent airfield. A permanent asphalt-surfaced runway, together with simple terminal, operating and ancillary buildings, is being constructed to a length of 1,250 metres and ICAO class C standards. The consultant engineers, Rendel, Palmer & Tritton, carried out a design survey in 1971/1972 based on meeting the requirements of an F27 or HS748 aircraft. The former was the critical aircraft in determining runway length and the latter with regard to pavement thickness. The runway length of 1,250 metres recommended by the consultants is sufficient for an F27 payload capability of 7,500 lbs. This is rather less than the maximum payload, with full fuel, of 8,500 lb and allows a saving in runway length of 275 metres. Although the design LCN (load bearing factor) was only 15-20, the actual LCN is expected to be somewhat higher - as much as 25-30. Construction by Johnston Construction Co Ltd, a UK firm, commenced in late 1974 and is expected to be completed in mid-1976. A 4-mile gravel-surfaced road to Stanley, which also forms part of the contract, should be completed in the third quarter of 1976. The final cost is now estimated at about £4½ million[2].

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1 In accordance with item 2 of the Joint Statement. The temporary card is intended to apply to Falkland Island residents and Argentinians although it appears to have been interpreted more widely by the Argentinian Government.
2 This compares with the consultant's preliminary cost estimates, in early 1972, of £1.8 million.

It would seem that no estimate of the likely operating deficit of the permanent airfield was made at the time of the decision to build. This could eventually be of the order of £100,000/year.

The aircraft currently in service for scheduled passenger operations in South America, which technically speaking could provide a feeder service from the Mainland to the airfield are set out in Table 48.

The new runway will be able to receive most of the 83 propeller driven aircraft currently in service with the airlines of nearby South American states, but none of the 88 short/medium haul jets, except the F28, loaded well below capacity. Also an increasing number of the propeller aircraft (many of which, such as the DC3's, are aged) are being replaced by the larger and faster jets, in particular the Boeing 737, the Boeing 727 and the F28. It is therefore possible that by the 1980's the new airfield will be able to receive less than one third of the aircraft in service with these South American airlines. Moreover, although some of the propeller aircraft are theoretically capable of flying to Stanley from further afield than Patagonia, flights of greater lengths in this type of aircraft are unlikely to take place for both economic and safety reasons.

Table 48. Short and Medium Haul Aircraft with South American Airlines

	Total propeller	Total jets	Propeller aircraft: Curtis C46	Canadair EL44	HS 748	DC3/ C47	DC6	Vickers Viscount	Lockheed Electra	F27	F227	Jet aircraft: F28	727	737	BAC 1-11
ARGENTINA															
Aerolineas Argentinas	4	15			4							3		12	
Austral	2	–	1				1								
LADE	12	5					3			9		5			
BRAZIL															
Cruzeiro	9	14				5			4				8	6	
Transbrasil SA		10							–				4	–	6
Varig	17	19			7				6		4		9	10	
VASP		16												17	
CHILE															
Lanchile	12	4			9	3							4		
Ladeco	6	–					6								
PERU															
Aeroperu	3	4		1	–					2		3	1		
URUGUAY															
PLUNA	15	–		–	–	10		5							
TARI Platense	3	–		3	–										
Totals	83	88	1	4	20	18	10	5	10	11	4	11	26	45	6

Source: Flight International December 1975.

External sea freight service

Darwin Shipping Ltd (DSL), a wholly-owned subsidiary of the Falklands Island Company, runs a quarterly sea freight service from London to Stanley. The vessel in use is the "Anne Bewa", of 77 metres in length, 500 gross and 326 net registered tons, and has a 105,000 cu ft bale capacity. It is chartered through Jeppeson and Heaton from the Danish Bewa Line at 8,200 krone a day. DSL bears the cost of port charges.

The service, which is operated on a common-carrier basis, transports general cargo and parcel mail on the four outward journeys to the Falklands (about 30 days), and carries back the wool and hide exports on three of the return journeys. On each outward journey the ship calls at Mar del Plata in Argentina to collect fuel and fresh provisions such as fruit. On the fourth return journey, with no wool cargo, timber is sometimes carried from Punta Arenas in Chile back to London. This voyage is usually unprofitable.

FIC does not follow a policy of maximising profits on this operation. This is borne out by the generally low profits of Darwin Shipping Ltd and the fact that freight charges as a proportion of landed costs have tended to decline over the last ten years.[1] However, counterbalancing this trend, FIC's handling charges and their London Office Commission have both increased, the latter from 2½% to 5% of total landed cost.

1 Based on a random sample of 10 commodities, average freight mark-up declined from 12.9 per cent of landed cost to 8.1 per cent between 1965 and 1975.

Naval and NERC/BAS vessels. These visit the Islands, chiefly in the summer months, when they are engaged in their Antarctic and southern Atlantic operations. They comprise:

- HMS Endurance, ice patrol and survey vessel;
- Other fleet Royal Fleet Auxiliary tankers carrying bulk diesel fuel (see Chapter 11) at approximately 18 month intervals;
- British Antarctic Survey and NERC research vessels.

All occasionally carry mail and passengers on their outward and return journeys to and from the UK, but their direct contribution towards the Island's transport services is negligible.

There are also periodic visits by vessels of the Argentine STN.

Ports and jetties

Stanley is the only port in the Islands, having been selected in sailing ship days because of its sheltered harbour which, although almost land-locked, could be entered on one tack in most winds. As a port, it suffers from the disadvantages of shallow channel depth - maximum 8.5 metres - and from not being centrally situated in relation to the rest of the Islands. Since the opening of the Panama canal, it is no longer a bunkering port of any significance. Nevertheless, there has been a steady increase in the number and tonnage of ships over the last five years, from 35 and 55,000 tons respectively in 1971, to 49 and 101,000 tons in 1975. Much of the increase has been in cruise ships (see Chapter 12).

The main facilities at Stanley (see Fig 7) are three usable jetties, all of which are ageing:[1]

1 The 1975 Pencol report reviewed the use and condition of the jetties.

- FIC Jetty;
- Government Jetty (mainly M.V. Forrest);
- Public Jetty (passenger landing only)

The FIC jetty, which has a 14' draught limitation, is the only loading/unloading point for the external sea freight service, as well as being the distribution point in Stanley for coastal shipping (see later in this section). Near the jetty, the Falkland Islands Company has five sheds or warehouses. Most important are the wool store, which can hold up to 1,800 bales (1/3 of the Island's clip), and the Transit Warehouse where goods for onward consignment to camp settlements are held. For loading and unloading there are only one crane and four tractors and trailers. Even with overtime working by the jetty gang turnround time for the "Anne Bewa" averages 10 days.

On the basis of present plans the Alginates plant would be sited in Port William (outside Stanley harbour) with its own loading facilities.

There are several other potentially excellent harbours around the Falkland Islands:

- Mare harbour)
- Adventure harbour)
- Barrow harbour) Adventure Sound
- Port San Carlos)
- Albemarle Harbour)
- Port Edgar) S. coast of West Falkland
- Chatham harbour - Weddell Island

Most camp settlements have their own jetty for loading wool bales and unloading goods and equipment.

Internal air service

The Falkland Islands Government Air Service (FIGAS), provides the principal means of internal passenger movement. FIGAS was established in the early 1950s mainly to provide a medical service. It now operates two De Haviland Beaver float planes, each with a capacity of six passengers plus some freight. Both are 7 years old and are becoming increasingly expensive to

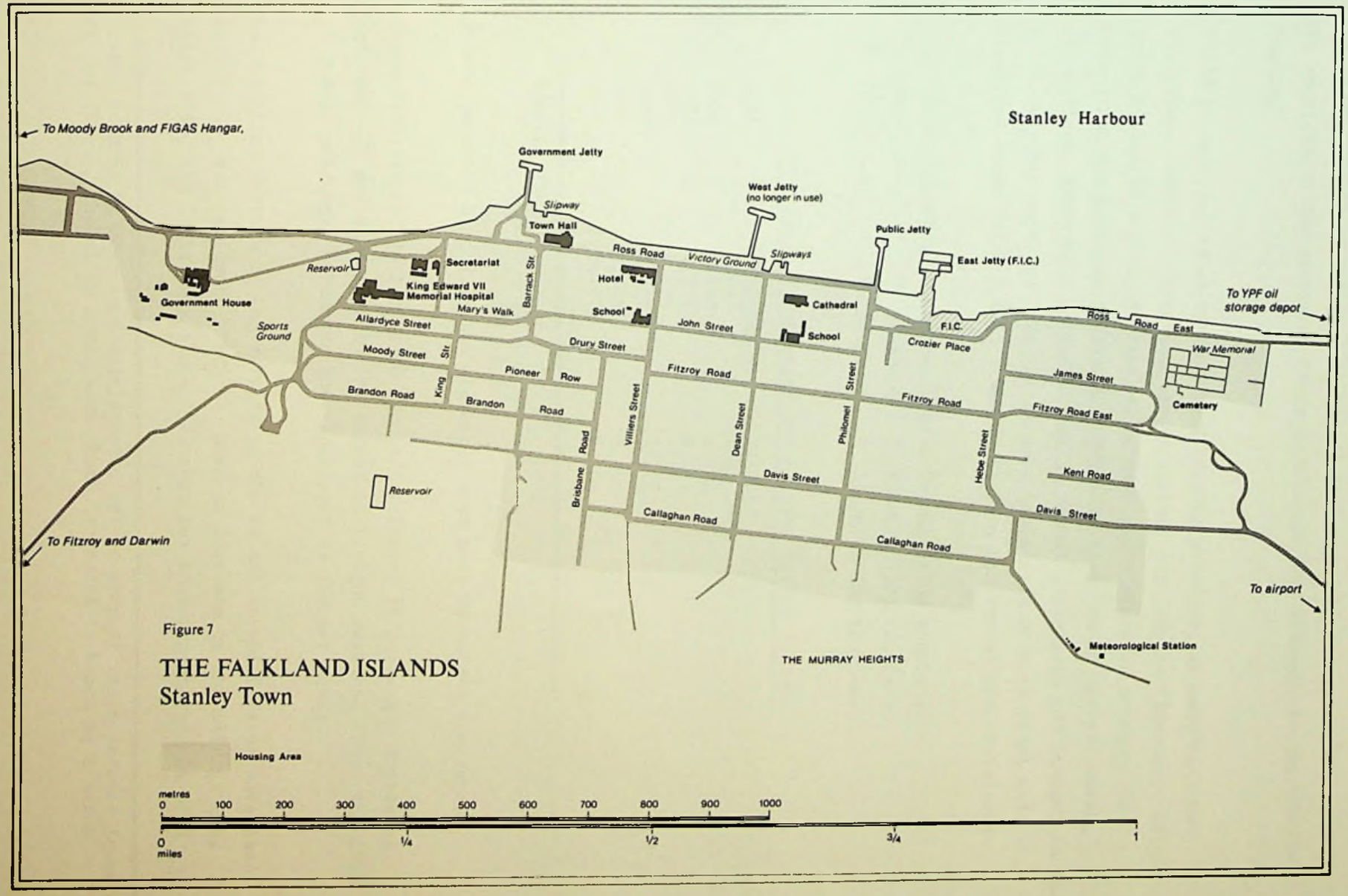

Figure 7

THE FALKLAND ISLANDS
Stanley Town

maintain. FIGAS is run by 2 pilots, 2 engineers, 2 labourers and 1 clerk. In addition to the aircraft, there is a hangar and slipway[1] to the west of Stanley.

FIGAS is operated as an on-call taxi service providing an essential and subsidised means of transport between Stanley and Camp settlements. Little prior notice of a trip is required as each day's aircraft schedule is worked out the previous afternoon. Priority is given to medical cases, councillors, government officials, mail, normal passengers and freight in that order Relatively few days are lost due to poor visibility or high winds and, at least one plane flies 5 days a week. Charges for travel are as follows:

Adults boarding fee of £4.50 plus 5p/mile (10p tourists)
Child 7-15 " " of £3.00 " 5p/mile (10p tourists)
Child 1-6 " " of £1.50 " 2½p/mile (5p tourists)

Table 49. FIGAS - Passenger and Freight Volume 1970-75

Year	Passengers (nos)	Freight (lbs)
1970	3,683	8,486
1971	3,911	8,491
1972	4,225	13,971
1973	4,327	16,729
1974	4,666	18,840
1975	5,183	19,000

Source: FIG.

Demand peaks in May, July and September when most vacations are taken.

Since 1970, there has been a 40 per cent increase in passenger movements and some 130 per cent rise in the amount of freight carried. Over the last 15 years, passenger movements have increased by 150 per cent.

One striking feature of the service is the extent to which fares have been held down. For residents there has been no increase in the mileage rate since 1954, and it is only since 1972 that the boarding charge has been

1 For docking at most camp settlements, use is made of their jetties (except at low tides), though in some cases there is resort to boats or a beach.

raised. Even so, a typical adult trip to Stanley from a settlement of intermediate distance (50 miles) would cost about £7 single. It is not surprising therefore, that the service has run at a loss in spite of the rising utilisation. The position over the last two years has been as follows:

Table 50. FIGAS Revenue and Expenditure, 1973/74-1974/75

	Revenue	Expenditure*	Deficit
1973/74	29,825	49,113	19,288
1974/75	37,706	68,991	31,285

* This excludes depreciation on equipment and some indirect overhead costs.

Source: FIG.

Comben and Waller pointed out in early 1973 that the true subsidy was in the region of 50 per cent; they recommended a rise in fares to reduce the subsidy to 25 per cent. Using similar estimates of depreciation and overheads, the subsidy element had increased to 55 per cent by 1974/75. The large increase in the deficit in 1974/75 reflects the 50 per cent increase in fuel and lubricant costs, and a doubling of maintenance and repair costs.

On present traffic levels and boarding fees, the mileage rate would need to rise to 12-14p a mile to break even on a full cost recovery basis. Despite the fact that such a level would be similar in real terms to the cost of internal air travel in 1954, there would be much resentment and hardship among some Camp residents, even though demand has shown itself to be relatively inelastic in the past.

Coastal shipping

Coastal Shipping Ltd operates the MV "Monsunen" a vessel of 221 gross and 113 net registered tons, with a length overall of 113 ft. She was built in 1957 and came into Falklands service in 1972, being chartered by Coastal Shipping from a joint venture of 50 per cent FIC and 50 per cent Jeppesen Heaton Ltd on an annual bare -boat basis of £8,400 plus £900 for a sea truck. The "Monsunen" is manned by a crew of 7 and delivers freight of all

kinds and sea mail to Camp settlements, and collects the wool crop, hides and skins, and some vegetables. Live sheep are also carried to Stanley and between settlements. In 1975, the vessel spent 162 days engaged in coastal operations on 37 separate trips. Two voyages between Stanley and Punta Arenas took a further 23 days, including annual maintenance. Since most weekends are spent in Stanley there is thus a reasonable degree of utilisation over the year. For intra-Islands traffic an itinerary is published in advance.

As with the external freight service, coastal shipping is operated on a common-carrier basis and there is rarely a need to ration cargo space. The company is registered in the Falklands and is limited by guarantee of £25 per member, the guarantors being FIC and most other farm companies.

Coastal Shipping Limited is owned by a consortium of farm owners and pays a fee to the Falkland Islands Company, who manage the ship's operation. The consortium's policy is to break even, and freight rates are fixed accordingly. The structure of rates varies mainly with the distance of the settlement from Stanley and the classification of settlement jetty facilities into three categories. Thus charges are higher for settlements with jetties which cannot be reached at low tide, and higher still where no jetty exists and discharge into a scow is necessary.

Whilst the overall service appears to be satisfactory, the present vessel does suffer from a number of defects, principally:

- limited bulk gas oil capacity;
- unsuitability for carriage of petrol (in drums) and gas cylinders;
- poor crew accommodation;
- restricted capacity when carrying mixed cargoes of wool, sheep and goods;
- unsuitability for deck cargo, which limits overall capacity;
- some technical limitations such as a two, rather than 3 or 4 blade propeller, and sea rather than fresh water cooling, which increase running costs.

In addition to the MV "Monsunen", there is also the purpose-built MV "Forrest", owned by the FIG. She used to operate a limited and under-utilised freight service to settlements until the coming into service of the "Monsunen". She is now on full-time charter to the Royal Marine detachment.

Roads

Stanley roads. Stanley has about 8½ miles of roads of which almost 6 miles are surfaced with tarmacadam or concrete and the remaining 2½ miles consist of rock-rubble. The unsurfaced roads, not surprisingly, are generally in a very poor condition, but the condition of many of the surfaced roads is also poor and there is an abundance of potholes.

Stanley roads have suffered from a long history of neglect for various reasons. In October 1963, Mr M.P. O'Reilly of the Road Research Laboratory described the tarmacadam surfaced roads as "raw, open-textured and variable" and he recommended a regular surface dressing to the roads, to render them impervious and prevent ravelling and fretting of the surface. Mr O'Reilly observed no indications of structural inadequacy in the tarmacadam roads and considered the pavement thickness adequate for the light town traffic. He considered the conditions of the concrete roads to be generally good but recommended the resealing of joints and filling-in of cracks.

A provision of £9,000 was included in the 1975/76 estimates for the repair and improvement of Stanley roads but the public works department was unable to secure the necessary labour, because the construction of the permanent airstrip had absorbed all spare manual labour.

Public Works Department has carried out a survey of Stanley roads and has identified the tarmacadam roads which require pothole repairs and a sealing coat, or resurfacing. In principle it would be feasible to proceed with the road works as soon as local labour becomes available again but the PWD at present lacks anyone with experience of tarmacadam road construction or repair.

Camp tracks. A network of unsurfaced tracks, used by landrovers, motor cycles and lorries, link most settlements on East and West Falklands, and also outside shepherds' houses with their farm centre. The tracks generally follow the easiest line between settlements in terms of gradients and stream crossings, and also avoid wherever possible stone-runs and soft peat. Most of the main tracks have bridges and culverts. There is no systematic maintenance although farms do repair the worst stretches. Travel is slow because of the rough conditions of tracks and the need to negotiate farm gates. Average speeds vary between 6 and 12 miles an hour, the slower speeds being a feature of the rougher tracks and winter conditions.

In 1965, government introduced a camp track scheme to provide farms with grants for improvement of tracks, bridges, culverts and drainage. Up to the end of 1972, a total of £3,030 was disbursed under this scheme, it being closed in 1972 as an economy measure. However, funds were provided in the development estimates for culverts on minor roads and in the two years 1973/74 and 1974/75 over £2,000 was spent. Some tracks were improved in the past by removal of the vegetation and top soil and filling with gravel. Although drains were constructed, many of these improved stretches of tracks are now in an impassable condition due to erosion and lack of maintenance. Parallel tracks have developed.

Vehicles. Given the lack of suitable roads, the number of vehicles on the Islands is surprisingly high. In 1974, the number of persons per landrover/car in the Islands at 3.9 was the same as in both the UK as a whole and the Scottish Highlands and Islands. Including motor cycles with landrovers and cars, the number of personal vehicles per person is in fact significantly higher than in UK, 0.4 compared with 0.28. The typical annual mileage for a privately owned landrover is about 1,000.

Given the limitations of the data, no clearly discernible trends in numbers of personal vehicles exist. The number of tractors, however, appears to have steadily risen as a result of farm mechanisation programmes. There has been a marked shift from petrol to diesel landrovers, due to differences in fuel prices since 1966, the number of the latter having risen from 67 to 283.

Because of rough road conditions and low annual mileage, vehicle travel is expensive. As will be seen from Table 51 below, the average cost per mile for a petrol landrover is about 33p, excluding the cost of labour in maintenance and repairs which are usually done by the owner. The variation between summer and winter conditions is about 3p/mile.

Table 51. Estimates of Vehicle Running Costs
(£)

	Average annual costs
Depreciation on 1970 Landrover	200
Petrol @ 85p/gallon for 1,000 miles	78
Oil	6
Spare parts	45
	329

NB: Cost per mile (based on 1,000 miles average annual travel) = 33 pence.

Source: EIU estimates.

It is clear that the cost of mobility is very high and that this severely restricts social contact between settlements. Thus the average cost of a journey from Goose Green to Stanley would be between £20 and £22. Only with three or more adults using the landrover would this be cheaper than travel by float plane. However, as most landrover owners do not maintain cost records or take account of depreciation the perceived cost is much lower.

Future development of transport

The time available in the Islands to the Survey Team did not permit a detailed evaluation of the need for the further development of transport facilities nor of the cost of supplying those needs. Coupled with the limited nature of the existing data this prevents any detailed evaluation of possible transport development in economic and social cost/benefit terms. That said, the importance of an adequate transport network to the future development of the Falkland Islands cannot be over emphasised.

External air service/extension of runway. It has been demonstrated (see page 212) that the permanent runway will only be capable of receiving about 40 per cent of fully loaded short/medium haul aircraft now operating in most major countries of South America. This proportion is likely to decrease as the number of short/medium haul jets in these countries increases. Although the present propeller aircraft are capable of flights to the Falklands from places further afield than Comodoro such as Buenos Aires and Montevideo, it is unlikely that flights of this length in these types of aircraft would be economic. It is therefore probable that air traffic to the Falklands will continue to be limited to the LADE service from Comodoro (or other airfields in Patagonia, southern Chile or Tierra del Fuego) with the attendant inconvenience and extra cost.

In this situation it is our view that certain kinds of developments will be severely constrained.

i. Tourism - Charter companies using international and South American airlines will be discouraged from establishing a last leg linkage with the Islands. Potential tourists in South American cities, particularly Buenos Aires and Montevideo are much less likely to travel, if they cannot fly direct. Under these circumstances it seems unlikely that any enterprise would be prepared to make the substantial investment needed in hotel, chalet and other tourist facilities on the Islands.
ii. Alginates/other medium term development - the longer and more costly air route via Comodoro will inhibit personal travel and, possibly marketing arrangements.
iii. Fisheries - looking to the longer term it is less likely that the Falklands would become a fisheries base for exploiting the offshore resources potential, assuming it were realised, with poor external communications and hotel accommodation.

Quantification of the benefits to the Falkland Islands of these potential developments in order to assess the economic return from lengthening the airstrip is extremely difficult. Quite apart from the fact that there is

no absolute certainty of the developments taking place, their timing and scale cannot be defined with any degree of accuracy. However to provide some guidance as to the economic justification for the investment, the following represents the order of magnitude increase in value added to the Islands' gross income that could eventually result if the airfield was extended.

	£'000	% current GDP
Tourism*	340	14
Alginates (initial stage)	200	8
Other diversifying industries*2	25	1
Total	565	23

* Mainly from tourists arriving by air, not by cruise ships. See Chapter 12. *2 Estimate for additional activity stimulated by presence of extended airfield.

Fisheries have not been included since much less is known of the potential resource and it is not certain that the industry would be based in the Falklands. It is assumed, perhaps conservatively, that there would be a 10 year linear build-up to the additional level of economic activity indicated above.

By lengthening the runway by about 950 metres to 2,200 metres, and strengthening to an LCN of 65 to 70, the airfield would readily accommodate short and medium haul jets such as Boeing 737's, and also part- loaded long haul jets such as Boeing 707's on final short stages from Buenos Aires or Montevideo. The capital cost of the extension and addition of other necessary facilities is estimated to be of the order of £3-4 million.[1] Based on the experience of similar small airports and an additional maximum air traffic of 100 aircraft/year the extra operating and maintenance cost arising from the extension would be in the range of £80,000-120,000/year, from the fourth year. Offsetting this would be revenue extracted in the form of landing and parking fees, air traffic control (ATC) and, for charter traffic, a per head charge. By the end of the traffic build-up period, revenue would normally be expected to at least offset operating and maintenance costs (margins on small island tourist oriented airports in the Caribbean can be of the order of 30-50 per cent). However with an additional 5,000-7,000 visitors by air arising from the developments

1 This very approximate estimate includes the costs of additional taxiing area and such necessary additional landing facilities as an improved radio beacon, landing lights, fire fighting equipment etc. This estimate takes into account the cost of the permanent runway and the fact that most of the necessary heavy plant and labour would be in place for the extension, if carried out at an early date. The permanent runway can probably be strengthened by resurfacing.

mentioned, the maximum additional number of short/medium haul aircraft per year would be 100. So that assuming a per aircraft charge in the order of £100 (based on similar small airfield practice in Latin America), and an additional £2 per head levied on tourist charter companies, the maximum total airport revenue assuming a ten year build-up would be about £15,000/year. From this it can be seen that a recurrent and unavoidable operating deficit of the extended airfied would arise. This would be additional to the deficit expected from the operation of the permanent airfield now being completed.

If future costs, revenues and income to the Islands are discounted at 8 per cent (the project evaluation discount rate recommended by the Ministry of Overseas Development), the present value of future gross income of possible developments over 20 years (less costs) amounts to £2.8 million. The calculation is set out in Table 52 overleaf. In other words, on the assumptions made, the present value to the Islands of those development projects conditional on the extension of the runway is a little less than the expected capital cost of the extension. It can be argued that Alginates and other small developments could take place without the airport extension, but it can also be said that no potential benefit has been allowed from the possibility of any fisheries development, which would be unlikely to occur with the present limited airfield. Although the evaluation is necessarily crude, it does at least provide a broad indication of the economic benefit to compare with the estimated capital cost of a runway extension. This analysis does not identify the return to HMG of capital expenditure on the runway extension (which would be very small or even negative) but simply compares capital cost with potential economic benefit to the Falklands. Nevertheless, it should be fully recognised that, without the airfield extension, it is very doubtful whether the potential economic growth identified in other sections of the report would ever be realised.

Finally it should be mentioned that the extra jet fuel needed if the airport expansion took place might well be able to be carried out using the existing YPF facilities. This does not necessarily mean that YPF would be prepared to make additional quantities of aviation fuel available to non-Argentinian airlines. The aspect of fuel supply would therefore need careful consideration.

Table 52. Cash Flows Associated with Falkland Islands Airfield Extension
(£'000)

Year	0	1	2	3	4	5	6	7	8	9	10	11-20
Op/main costs		(50)	(70)	(90)	(100)	(100)	(100)	(100)	(100)	(100)	(100)	(100)
Airfield revs.		2	4	5	6	8	10	12	13	14	15	15
Dev. income		56	112	168	224	280	338	394	450	506	565	565
Total		8	46	83	130	196	248	306	363	420	480	480
Discount factors		.925	.857	.793	.735	.680	.630	.583	.540	.500	.463	.310 Avg.
Present value		7	40	66	95	133	156	196	210	222	149	149 Avg.

Total £2.8 million.

External sea freight service. The current FIC-run service is efficient (apart from the slow loading/unloading operation in Stanley) and reasonably priced. Its main deficiency is its infrequency from the point of view of delivering fresh produce and goods to the Islands. This infrequency is also a potential constraint on export of goods from any diversified industry development such as knitwear.

Ports and jetties. The jetties in Stanley including the FIC east jetty over which virtually all cargo is moved in and out of the Islands, were found to be in generally poor condition by the 1975 Pencol report. Also water depths alongside the existing jetties severely restrict the size of vessel (14 foot draft) that can berth. The depth of the channel in Stanley harbour is 27 feet. Major investment, involving possible extensions or repair are clearly going to be needed at a future date. There is perhaps a case for extending both the public jetty and FIC jetty, and joining up the two. This would be a joint private and public sector project with the potential benefits of greater efficiency and handling capacity for FIC (which should work its way through to consumers in terms of cheaper prices) and some control by FIG on jetty operations, a vital aspect of the Falklands' economy. Such a project would depend on future increased development in the Islands and would require a detailed study. Any other port development will depend upon the outcome of any fisheries or oil development.

Internal air service. This service was without exception praised for both its efficiency and reliability, albeit that it is not cheap. There are several points which will need consideration in the near future, and which will require action to be taken.

i. Capacity - there is only limited additional passenger capacity in the existing air service, given the manner in which it is operated. This is estimated to be 15-20 per cent;
ii. Age of aircraft - these will need to be replaced in the next 2-3 years;
iii. Operating deficit - there seems to be no scope for reducing this by improved productivity. The size of the defict is therefore a matter for a decision by FIG over the acceptable level of subsidy. However, there may be

a case, in view of the low price elasticity of air travel, to increase the charges gradually. The correct balance between boarding and per mile charges again is a matter for FIG resolution.

It is impossible at this stage to prescribe the correct aircraft replacement policy. There are a number of small float plane alternatives including the Beaver (second hand but with reasonable lifetime expectation), Cessna Stationair, Brittain-Norman Islander, Otter and Dominion Skytrader. They all vary in size and capital cost and would have different pilot training and operating costs associated with them. Although the Beaver is no longer manufactured by De Havilland, it does have the advantages of relative cheapness, familiarity of the two pilots (one of whom is approaching retirement) and the fact that operating a three Beaver service would offer flexibility for the future. It should not therefore be discounted.

The other major factor to be considered is future passenger load, which in turn depends on:

a. the rate of growth of the economy: In the longer term the establishment of a major fisheries' development away from Stanley would very significantly increase carriage requirements. However in the medium term, the rate of build-up of the tourist trade will be crucial in determining the load factor of passenger/miles. It would therefore seem advisable to either wait, if possible, to see if the major constraints on the development of the tourist trade are removed (see Chapter 12), or to adopt a policy which is sufficiently flexible to allow this growth to be integrated with whatever new air service is adopted:

b. the development of alternative means of transport: The development of some Camp roads (discussed later in this section) would have a major effect on the internal air traffic load. Secondly, it is possible that some coastal passenger ship service could develop, particularly to cater for the tourist trade.

In summary, therefore, the uncertainties about the carrying capacity required in future dictate a policy of extreme flexibility towards the number and type of aircraft selected to replace the two existing Beavers. This should be incorporated into any future feasibility study on the question.

Coastal shipping. The service provided by the "Monsunen" operates reasonably efficiently. In spite of some complaints over charges we do not take the view that they are unreasonable, given the costs of the operation. A number of physical and operating defects were listed for the "Monsunen" but these could best be overcome by a refit, rather than purchase of another vessel which in turn would have other defects.

In the future operation of coastal shipping it is important that the needs should be met of any increased settlement and farming of the small islands by individual tenants or owner occupiers.

The possible extension of the coastal shipping service, if the economy develops, should be kept in mind. The addition of a small, adaptable, fast craft, capable of carrying freight or passengers would facilitate any diversification in agriculture (including the creation of more small farm units on the islands), and also the development of tourism. The service would be integrated with any camp road network constructed. In this respect a hovercraft might have been suitable but can probably be discounted because of its high capital and operating costs. A hydrofoil service would be severely inhibited by the presence of floating kelp.

One possibility might be the introduction of a 12 metre Rotork passenger/freight vehicle ferry which can carry 20 passengers and a vehicle, or more passengers but no freight, or freight (wool, animals etc) only. Vessel draft is very small and using a front loading ramp, beach landing is possible. It can obtain speeds of 20-30 knots but, although apparently able to operate in force six or seven winds, it is not known how suited it would be to the sea conditions of the Falklands. Operating costs[1] seem competitive with other modes of transport and its versatility would make it highly suited to supporting diversified agricultural activities such as vegetable shipment to Stanley, coping with increased small island settlement, and servicing the tourist trade. Such a vessel might be owned and operated either by an Islands tour operator or by the farm/hotel company which develops tourist facilities on particular islands (or mainland settlements). Again a consortium ownership of different interests might be the optimum solution.

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1 Based on diesel at 40 p per gallon and assuming a crew of two (one might be feasible), 1,000 operational hours a year and running on an average of 50% capacity, costs per passenger mile would be about 6p and per ton mile about 20p.

Further investigations into feasibility would of course be needed.

Stanley roads. We concluded that while the need to repair and maintain the roads in Stanley is well recognised and a sum of £9000 was set aside in the Estimates of the Public Works Department for 1975/1976, commencement of work has been deferred due to shortage of labour.

The basic equipment and most of the materials for the road work are available locally.[1]

The most economic solution with the maximum long term benefit would be to form and train a local road gang. Since the PWD lack any experienced road foreman, it would be necessary to introduce such a man. The duties of the foreman would be to train a team of six local men to carry out all the necessary road repair and maintenance work in Stanley. He should also supervise the recruitment and allocation of workers to the road construction unit recommended for camp roads below.

The survey of Stanley roads carried out by the Public Works Superintendent should be used as a guide to the work (pothole repair, resurfacing and surface dressing) which needs to be done. Assuming use of existing tar stocks, the cost of materials would be about £1,500, and of labour about £16,000 a year, including a foreman and six labourers.

It is possible that this activity could be hived off to a suitable local contractor, who would contribute a proportion of the training costs. This would avoid the need for a permanent road gang, for which there may be permanent work, to be on the FIG payroll.

Camp roads. A full assessment of the economic and social benefits of a road system in the Falklands would require a survey of the following:

i. number of different kinds of vehicles by settlement (with estimates of likely increases);
ii. potential journeys by origin and destination for business and leisure;
iii. vehicle operating costs/mile on road compared with those over different camp terrain;

1 The PWD possesses a spot mixer, a tar sprayer, an 8-ton roller, a smaller roller and a rock crusher, and furthermore 53 tons of suitable tar.

iv. time savings realised for different agricultural activities;

v. comparative cost by settlement of wool shipment to Stanley by road and that by coastal vessel;

vi. potential additional tourist and other economic activity generated by presence of road system;

vii. strength of social need for roads and an assessment of the long term indirect economic cost if this need is not met.

Clearly such a survey could not be carried out in the time at our disposal. It is however possible to describe certain relevant economic parameters and social aspects.

Unless a major industrial development such as fisheries were located in the Falklands, with a relatively large associated population, it is very unlikely that on any economic grounds it would be possible to justify building tarmacadam roads. There are, however, various forms of low cost roads, with different capital and maintenance costs which are accordingly capable of bearing certain axle loads and enduring certain vehicle speeds. These are described in Appendix 1. Basically they would all make maximum use of local materials of soft rock, shale, beach gravel and sand, and would be cut, filled, graded and drained to various degrees. The construction method 2 (a), described in the Appendix, is the cheapest as it minimises the movement of fill material. Without some experience of building these type of road over Falkland terrain it is impossible to be precise about costs.

The Forestry Commission, who have a great deal of experience of constructing this type of low cost road over terrain similar to that of the Falklands in the north of Scotland i.e. peaty, undulating soils, calculate their road costs at £7,500-£13,000 per mile, inclusive of normal culverts and bridging. These roads permit travel at 20 mph and are built to take 25-30 ton vehicles. Although this exceeds the weight load that would be required in the Falklands, it is probable that vehicle load in terms of numbers

would be greater in the Islands. This cost compares with about £80,000 per mile for the Stanley airport road. The main reasons for the lower cost are:

- the construction method used is much cheaper;
- the approach to road construction is different, involving minimal survey work and then design and construction in operation, instead of survey, design, and construction as three separate stages;
- the Commission has gained considerable expertise and uses an optimum mix of equipment and highly-trained men each of whom operates a number of different machines.

Assuming a road of this type were constructed in the Falklands from Stanley across East Falkland to Goose Green/Darwin, taking a cost of £15,000/mile (a slightly higher estimate is taken as the experienced labour force for constructing the road is not available in the Falklands), the 60 mile stretch would cost very approximately £900,000. If one takes a capital recovery charge of £80,000 based on 8 per cent over 30 years and an estimated average annual maintenance cost of £25,000[1]/year, the total annual costs of this road would amount to £105,000.

Goose Green/Darwin, the largest settlement outside Stanley, has a population of 140, and about 50 vehicles, including motor cycles. It is unlikely that there would be cost savings in shifting the wool clip and the supply of goods and materials between Goose Green and Stanley from coastal shipping to road, after the capital costs of trucks have been taken into account, so that the direct benefits would have to come from cuts in business and leisure vehicle running costs, improved farm labour productivity, and additional economic activity. The annual operating cost savings, on the existing number of vehicles in Darwin/Goose Green (assuming that mileage per year per vehicle doubled to 2,000, and that costs per mile were reduced from the current average of 31p/mile to 25p/mile) would amount to about £11,000. Fuel consumption/ mile would approximately double and lifetime of

1 This figure is approximately based on costs incurred by the Forestry Commission.

the vehicle over which to depreciate the capital cost could be expected to rise by about 50 per cent . Savings on the number of Stanley based vehicles which at the moment travel to Goose Green (not more than 10 x 2,000 miles) would add a further £2,000, giving a maximum total business/leisure use vehicle savings of about £13,000 a year.

This would leave £92,000/year of benefits to be found from increased labour productivity in farming activities and additional economic activity generated through the road construction. While there is a reasonable chance that some improvements would result, the scope is somewhat limited in agriculture since such a high proportion of vehicle journeys are into the Camp. Even under the most propitious circumstances the additional economic activity is unlikely to exceed £50,000/year, equivalent to a 2 per cent increase in GDP.

Although cost savings, productivity improvements and economic activity would be stimulated by the presence of Camp roads, their construction cannot, as the example above has shown, be justified solely on economic grounds.

The justification must therefore be on social grounds, and the argument we believe, is a powerful one. The desire for easier social travel is strong in the isolated communities. Not only would the quality of life be very much improved by roads, but a wider variety of recreational activities available and increased social contact would provide much needed intellectual stimulation for Camp dwellers and less dependence among the population.. In the long term this would have beneficial effects on the economy, and in the short term would help to stem emigration, particularly of young people.

Because the cost of estimates given cannot be considered to have a high degree of accuracy there is a need to proceed with caution in road construction. A road engineer, experienced in building low cost roads must be allowed to make proper on site estimates of construction and maintenance costs[1], giving particularly attention to the availability and cost of

1 The recurrent operating costs would be a major factor affecting the decision to procede with any Capm roads construction.

extraction of local fill materials and the relatively light traffic loads. After this evaluation has been made and fully reviewed by Government, construction of a selected road should begin so as to gain experience of the resultant costs and benefits. This would hopefully be as far as Darwin via Fitzroy, and should at the very least be to Fitzroy.

TELECOMMUNICATIONS AND BROADCASTING

Internal telecommunications and broadcasting in the Falkland Islands are the responsibility of the Posts and Telecommunications Department, whereas external telecommunications are now the responsibility of the Cable and Wireless Company.

Internal telecommunications

Internal telecommunications include the internal telephone system, internal telegraph service and the radio telephone network.

Internal telephone system. Telephones were first used in Stanley in the 1890s and in the early part of the present century (1906/07) the first of the Camp lines was completed between Stanley and Darwin. Other Camp lines followed during the next 20 years. Stanley's first magneto telephone exchange was established in the 1920s. The present telephone exchange, which was opened with 360 lines in 1957, was extended to 480 lines in 1964. Most of the settlements on East Falkland are connected to one of the four Camp lines which extend from Stanley to Darwin, Fitzroy, Port Louis and Teal Inlet respectively. The Stanley switchboard, through which all calls have to be routed, is fully manned during the day from 08.00 hours to 22.00 hours. The period from 22.00 hours to 8.00 hours is covered by a night operator and only urgent calls are handled between midnight and 6.00 hours. The telephone call rate is relatively high (1,200 calls per line per annum), though meaningful comparison is not possible because of different proportions of party lines in the two communities.

There is also an extensive linked telephone system on West Falkland, with about 50 telephones in use on 219 miles of route, but there is no link with Stanley.

Radio telephone network. In 1950 the Government introduced a radio telephone system to serve the Camp. The control or master station was situated at Stanley and outstation R/T systems were established at settle-

ments at the Government's expense. The system operates at a frequency of 4.5 MHz with an alternative frequency of 2.0 MHz on a double sidebrand basis using 10-watt transceivers. The R/T service covers the whole of the Camp and, while most of the settlements on the two main islands have both the internal telephone and the R/T, they are heavily dependent on the R/T in many respects. The smaller islands are entirely reliant upon the R/T for rapid communications.

Internal telegraph service. The telegraph service continues to be used internally, presumably because many houses, especially in Camp, lack telephone facilities and because mail services in outlying areas are infrequent. East Island telegrams are usually sent over the telephone network to Stanley Post Office or directly handed in there.

A radio telegraph link exists between Stanley and Fox Bay East (the Government installed the Fox Bay wireless station in 1917) and all telegrams pass to and from West Falkland in this manner, routed through the Fox Bay Post Office.

Telegrams for external destinations are passed to Stanley Post Office for onward transmission via Cable and Wireless.

Assessment of internal telecommunications

The internal telephone system in Stanley seems effective and efficient. The Camp lines are much less satisfactory because circuits are often very noisy and ringing is difficult. The East Falkland Camp lines are worse than the West Falkland system in this respect. One serious disadvantage in West Falkland is the impossibility of telephoning Stanley (except, of course, on the R/T). International connections are extremely difficult on the East Falkland Camp lines and are only practicable, in effect, from Stanley.

The R/T is an immensely important service to the camp. It is an essential lifeline in times of emergency and it also fulfils a valuable social role in allowing people in remote locations to keep in touch with events by "listening in" to conversations. The widespread habit of "listening in",

however, makes it impossible to speak confidentially on the R/T and this can clearly be inhibiting at times. A serious disadvantage of the present R/T is that, because the system is old and the outstation transceivers are low-powered, reception is frequently poor and communication is practicable only during daylight hours.

In 1972 a comprehensive survey of internal telecommunications in the Falklands was carried out by Mr A.W. Le Fevre on behalf of the Crown Agents. The general conclusion of the Le Fevre Report is that the internal telecommunications system of the Falkland Islands is, by modern standards, unsatisfactory and inadequate. The Report recommends a complete upgrading and replacement of the system over a five-year period at a capital cost of £325,850 at 1972 prices, which at present-day values is likely to exceed half a million pounds. This, clearly, is a very large amount in the context of the Falklands; moreover, capital expenditure on telecommunications has to be assessed against other competing claims and justified in terms of the likely benefits which, for the forseeable future, would in no way match costs of this magnitude..

In the opinion of the Team the first priority, in terms of capital expenditure on telecommunications, should be the improvement of the R/T system. The Falkland Islands Government has already recognised this, and a provision of £40,000 has been made in the 1975/76 capital budget (£12,500 from Colony funds and £27,500 from UK Aid) for the purchase of new transceiver sets. A pilot scheme involving 4 sets of the chosen model is scheduled to commence early in 1976: 1 set will be used in Stanley and the 3 remaining sets will be tried in different Camp locations. The new transceivers will have a much improved antennae system and will be much more powerful (150 watts output as compared with 10 watts) with a range of 1,500 kms. This should ensure 24-hour communications throughout the Camp with little or no interference in most conditions. The sets will be small, light and compact, and capable of operating on six channels, one of which will have a carrier and sideband facility on 4.5 MHz. The remaining channels will be single sideband. For the pilot scheme, the channel with carrier and sideband will be programmed so that people will be able to listen in to routine R/T conversations in the traditional way. However, at the same time, a second channel operating on single sideband will allow conversations to take place with a degree of privacy.

The broadcasting service

The Falkland Islands broadcasting service operates each day for approximately five hours, of which about two hours are in the morning and the remainder in the evening. There are slight variations in the precise timing and duration of broadcasts, depending upon the day of the week, and there are some differences between the summer and winter schedules.

The programmes are mainly derived from BBC and other transcription services, BBC relays and gramophone records, but there is also a significant number of locallyproduced programmes.

Apart from the public service, commercial and continuity announcements and the weather forecasts, the local material includes a magazine programme, a children's programme, record request and personal choice programmes, occasional book readings in serial form, and reports on special local events such as sports meetings and dog trials.

Technical aspects. The broadcasting studio where the programmes are produced is situated in Stanley. Programmes are distributed by land line from the studio premises to the Government Wireless Station, which is just over a mile away, and to over 300 subscribers in Stanley by means of a wire relay system driven by a 100 watt amplifier. Two radio transmitters broadcast the programmes from the Government wireless station:

i. a 5 kw medium wave Marconi type TBM672A, installed in 1954, operating on a frequency of 536 KHz, and;
ii. a 0.5 kw short wave Redifon type G40, supplied in 1948, operating on a frequency of 3985KHz.

A technical survey of the broadcasting service was carried out in 1972 by I.C. Griggs of BBC External Services. The Griggs Report concluded that the broadcasting service provided reasonably effective coverage for about 75 per cent of the population most of the time, mainly by means of the medium wave transmission and the Stanley wired service. The remaining 25 per cent

of the population, principally located in West Falkland, receive the medium wave transmission fairly well during daylight, but are not so well served after dark when these signals are degraded by the effect of fading and increased noise and more reliance has to be placed on reception of the short wave transmission. The report points out that a substantial improvement in the technical quality of the service, to render it comparable with modern "hi-fi" standards of reproduction, is possibly only by using VHF/FM which would be extremely costly and present formidable problems in implementation and subsequent maintenance. Having identified the need for improved reception in the West Falklands as the main priority, the Report asserts that the best prospects for accomplishing this lie in effecting improvement to the short wave service by:

a. suitable choice of operating frequencies;
b. provision of aerial or aerials appropriate to the frequencies employed;
c. replacement of the existing old transmitter.

The Griggs report also advocates improvement and replacement of various items of studio equipment.

Since 1972 considerable progress has been made in implementing the recommendations contained in the Griggs Report. Much of the old studio equipment has been replaced and new tape machines, microphones and portable recording facilities have been obtained. This year a new amplifier has been purchased for the Stanley rediffusion system and plans are under way to instal two new (replacement) receivers plus diversity reception and a monitor amplifier.

The implementation of the recommendations concerning the transmitting equipment would, of course, be more costly, and there are no plans at present for the replacement of the 536 KHz (medium wave) transmitter. However, Cable and Wireless have offered to provide a short wave transmitter at an inclusive cost of about £650 per quarter. This arrangement offers the advantages of a substantial capital expenditure saving and (from the broadcasting service's viewpoint) a trouble-free transmitter since all maintenance and repairs will be carried out by Cable & Wireless. The transmitter should provide a much improved short-wave service and a trial period is about to begin. The frequency currently used for short wave transmissions is 2,370 KHz.

Qualitative aspects. While considerable efforts have been made to improve the technical aspects of broadcasting, less attention has been paid to quality. Survey team members were only occasionally able to listen to the local broadcasts, but the general impression gained (which was, in the main, confirmed by opinions elicited from Falkland Islanders) was that there exists a good deal of scope for improvement in the choice and content of the programmes. Some members of the community clearly view the broadcasting service as a Government organ dispensing, on the one hand, news and comment subject to strict control and censorship and, on the other hand, a rather bland diet of transcription and record programmes. In particular there is a conspicuous lack of lively discussion or debating programmes in which local people can express their views, opinions and ideas. There is room for more locally-produced programmes and far greater participation by local people.

External telecommunications

Since October 1974 the external communications of the Falkland Islands have been the responsibility of Cable and Wireless Ltd. The British company took on the task of unifying and reorganising the services formerly run jointly by the Falkland Islands Government and the British Antarctic Survey. Senior personnel were brought out from the UK for the initial setting-up process, but by mid-1976 these expatriate personnel will all have been replaced by local staff who have been specially trained by Cable and Wireless to assume their new responsibilities.

Cable and Wireless now provides an efficient external communications service which embraces the following:

i. Telegraphic and telephonic (2 hours a day) circuits to UK and outlets therefrom;
ii. telegraphic and telephonic services to Argentina;
iii. telex (outgoing) link to UK;
iv. telephone and telegraph circuits to and from the British Antarctic base;

v. ship to shore service to BAS ships, HMS Endurance and other vessels working in the area;

vi. sundry local services including out of hours safety watch on camp R/T.

CHAPTER 11 - DISTRIBUTION AND SERVICES

WHOLESALE TRADE

With the exception of a small wholesale importer obtaining goods from the Argentine, the only wholesaling activity in the Falkland Islands is provided by the Falkland Islands Trading Company (FITC), the FIC's subsidiary based in Stanley. In addition to operating its warehouses in Stanley, the FITC carries out the loading and unloading of ships (see Chapter 10), runs the Islands' largest retail store (West Store) and provides a rudimentary banking service. The management and operation of the West Store is integrated with FITC's wholesale activities.

FITC's wholesaling operations comprise:

1. Placing of orders. These are for FIC and other farms, for the FIC's retail outlet, the West Store, and also for other shops in Stanley. Indents are issued to FIC's London office for all goods except those supplied from Argentina. Orders are generally placed some 4 to 5 months before the scheduled sailing date of the charter vessel from London.

2. The storage of goods. For supplies to FIC and other farms, goods are held until the next journey of the Monsunen (see Chapter 10) to the appropriate farm settlement. In the case of supplies for the West Store, goods are held in store until required. Supplies to other shops are generally delivered shortly after unloading the charter vessel.

Wholesale margins are modest, being 5 per cent to FIC farms and 10 per cent to other farms.

RETAIL TRADE

There are 21 retail businesses in Stanley, of which 9 are part time, and some farm settlement stores. The latter mainly supply groceries but the larger ones also hold a small range of other goods.

Apart from FIC's West Store established in 1952, and a Co-operative Society, the other nineteen retail shops in Stanley are family or one man businesses, with premises which form part of, or are extensions to, private houses. A significant number are family businesses of long standing which have passed from father to son or daughter and have changed the nature of their business over the years. They bear many of the physical characteristics of a village shop in rural Britain. The bakery and dairies run a delivery service.

The salient features of retailing activity are:

1. The West Store holds a dominant position within the retailing sector. Its retail turnover accounts for just under half of all retail sales in the Islands and almost two thirds of retail sales in Stanley.

2. There is little specialisation, since retailers have attempted to expand sales by increasing the range of goods stocked. Most of the specialist outlets are part-time activities only, either in the sense of opening half days, or catering for such a small number of customers that the owner can carry on other activities as well as serve in the shop. Excluding the West Store, the average annual gross margin for Stanley shops was approximately £4,300 in 1974 having increased from some £3,000 in 1972.

3. There is excess trading capacity both in Stanley and in farm settlement stores. Thus the existing retail outlets could cater for a very much greater volume of annual sales with no additions to existing premises, except the provision of additional storage capacity. This accentuates competition, thus helping to moderate price rises. It has also reduced incentive to "modernise" premises by introducing labour or space saving investment which would increase either the sales per employee or sales per square foot.

4. Most supplies[1] come by the quarterly charter vessel from UK, which means that shops must hold substantial stocks to support sales until the next delivery. Average stock turnover appears to be only about twice a year. Slow stock turnround tends to discourage variety, particularly in the smaller general store.

5. Given the need for a high level of stocks, retail mark-ups are not excessive: 25 per cent on food, 33 1/3 per cent on clothing and 40 per cent on luxury goods appear to be typical.

6. Sales to tourists provide a useful addition to retail sales. Accurate details are not available but enquiries suggest that such sales accounted for between 10 and 20 per cent of total turnover in 1974 and 1975.

7. There is an almost total absence of advertising either on billboards or through counter displays.

Some further comments are called for on the role of the FIC's West Store given its dominant position in the retail sector. It fulfills a role as price leader for a wide range of products but there is no evidence that it abuses this position, whether for reasons of public responsibility or since other stores could undercut high-priced goods, albeit that they would generally need to import via the FITC. West Store does aim to provide a public service to the extent that it holds a wider range of goods than narrow considerations of profit maximisation would dictate, thus improving consumer choice. It also imports special orders for individuals charging only a very low mark-up.

One feature of retailing is the limited amount of purchasing either from Argentina or of fresh farm produce from local sources. In the case of Argentina, flour, fruit, and wines are good and cheap, but import of meat and bacon supplies is banned for animal health reasons, and there is said to be consumer resistance to most other Argentinian products on the grounds of variable quality.

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1 Some luxury goods (cameras, watches etc) are brought in by air, either direct from the country of origin or by sea to Buenos Aires and then onward by air.

Regarding local products it is argued that no one farm is able to provide regular supplies in sufficient quantities to justify a contract. This seems to be an area where West Store could play a leading role. It might experiment by inviting tenders for specified quantities which would then justify the farmer in making the necessary investment to meet firm orders.

FUEL SUPPLIES

Domestic sector...

The fuel market both in Stanley and the Camp is dominated by peat burning, with various smaller, and in some cases growing, contributions by propane gas, electricity, gas oil, kerosene and anthracite.

Peat. Peat bogs in Stanley are freely available for public excavation but are controlled by the Government. The vast majority of peat is hand dug and the whole business of peat digging is part of the way of life in the Falklands. However, as other social distractions compete for leisure time and as transport costs increase with the need to use new bogs 2-3 miles from the town, other more convenient domestic fuels have attractions. An average household, using peat for cooking, heat and hot water, will consume about 120-150 cubic yards/year which will cost about £50 for lorry transport, plus a further £45-60 if dug by a contractor. Most contract peat cutting is by hand, but one contractor is using machinery although still experimenting with the design of the bucket on the hydraulic arm. He is currently able to cut 300 cubic yards of peat per day and sells at 30p/cubic yard for cutting and stacking. There seems considerable potential for this enterprise.

In the Camp the peat is in most cases the property of the farm. It is cut and delivered free to the households as part of the conditions of employment for farm workers. In most cases a McConnel arm is used for cutting. At most settlements, the peat bogs are within a mile or two of the settlements but at some, such as Darwin/Goose Green, they are 10 miles away. The full cost of delivered peat on this settlement was estimated at around 40p/cubic yard; peat is thus worth £50/year to the average camp household.

Propane gas. Cylinders (44 kilos) of this fuel are sold under agency arrangements from the Argentinian gas company, Gaz de Estado, at £2.50. This is extremely cheap and reflects the fact that LPG is still being flared in the gas fields of Tierra del Fuego. Next year the selling price in Stanley is expected to increase to round £3.50 per cylinder.

Use of this fuel has grown quite quickly in Stanley with the increased use of gas appliances, and it is now used by about 25 households. There are plans to import the gas in larger containers and use these to fill returned cylinders at the depot on Philomel Hill in Stanley. Generally high wind in Stanley reduces the chance of explosion, but as there is a fire risk, an alternative location on the outskirts of the town would seem to be preferable. Gas cylinders are not available in Camp because of the fire risk of their carriage on the Monsunen.

Anthracite and kerosene. These are only consumed in small quantities, particularly in the Camp. The price of kerosene could theoretically be reduced to a third of its present price of 75p/gallon if the YPF agreement were ever implemented (see later section, this chapter).

Cost comparison of domestic fuel. The following sets out for comparability the price of each fuel per useful therm delivered.

1. Peat

   Total delivered cost = 70p/cubic yard

   At a density of 900 lbs/cubic yard,
   and a calorific value of typical F.I's.
   peat of 30% water content = 7,800 BTU's/lb

   Cost = 1.43p/therm

   Assuming flue burning efficiency
   of 50%

   Cost per useful therm = 2.9p

2. Propane Gas

   a. Delivered cost = £2.50/cylinder

   Each cylinder contains the equivalent
   of 21 therms of combustible gas (44 kg
   @ 5×10^4 BTU's/kg)

   Cost = 12p/therm

   Gas burners are practically 100%
   efficient

   Cost per useful therm = 12p

   b. If cylinder price rises
   to £3.50

   Cost per useful therm = 17p

3. Gas Oil

a. Current price = 41p/gallon

At 19,000 BTU's/lb calorific value

Cost = 25p/therm

Assuming 80% burner efficiency

Cost per useful therm = 31p

b. If the YPF agreement were implemented, (see 3rd section, this chapter) current price of gas oil in Argentina is 16 pesos/litre, which converts to approx. 26.8p/gallon @ 272 pesos/£1[1]

Cost per useful therm = 20p

4. Kerosene

a. Current price = 72p/gallon

At 19,400 BTU's/lb, calorific value

Cost = 44p/therm

Assuming 80% burning efficiency

Cost per useful therm = 55p

b. If YPF agreement implemented (as above under gas oil)

Cost per useful therm = 19p

5. Electricity

Electricity is sold @ 4.34p/unit

With 1 unit = kwh - 3,143 BTU's

Cost = £1.38/therm

Electric fires are 100% efficient

Cost per useful therm = 138p

From the above it can be seen that peat is by far the cheapest fuel in Stanley and indeed in the Falklands as a whole. It is less than twenty per cent of the cost of propane gas, or the cost of gas oil or kerosene under the YPF agreement. For the farms, the investment in machinery and labour costs is fully justified against the alternative of purchasing other fuels for the settlement. At most settlements reserves of peat are abundant at present levels of use.

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1 Argentinian fuel price and exchange rate after March 9, 1976 peso devaluation.

Transport/commercial/agricultual sectors

Consumption. For all these sectors, including electricity generation, oil products provide the fuel and are made up of:

1.	Motor gasoline	-	private, business and government use	
2.	Avgas 100/130	-	FIGAS (internal air service)	
3.	Gas Oil/Diesel	-	Government	a. transport/buildings
				b. power station
				c. MOD
			FIC Monsunen/farms	
			farm use	
			private transport	
			British Antarctic Survey	
			Johnstons - air field construction	
			bunkers	
			LADE - Argentine air service.	

Table 53 gives the Islands' consumption of these fuels over the last five years.

Table 53. Islands' Non-Domestic Oil Consumption*, 1971-75
(tons)

	1971	1972	1973	1974	1975
Gasoline	196*2	200*2	133	125	81
Avgas	70	84	92	88	94
Diesel/gas oil					
- Government	1,408	1,223	1,045	1,125	1,187
- Other	546	434	574	666	672
Total Diesel	1,954	1,657	1,619	1,791	1,859

* Avtur consumption (100 tons/annum but erratic) is excluded.
*2 Gasoline figures for 1971 and 1972 are very approximate since the 1972 figure incorporates an estimate of stock rundown from 1971.

Source: Government and FIC.

Figures exclude bunker supply, the BAS offtake and Johnston Construction's requirements. Bunkers can vary from 2,000 to 4,000 tons a year, depending

on the number of visits of HMS Endurance and tourist ships. In general the figures indicate an increasing farm use of diesel, to some extent at the expense of gasoline, the consumption of which is highly sensitive to price. The drop in consumption of diesel in 1972 reflects the build-up of consumer stocks before the withdrawal of the 'Darwin'.

Gasoline, avgas and kerosene are purchased by FIC from YPF on an ad hoc supply basis and distributed and sold by FIC within the Islands. The fuel is normally imported in drums on the quarterly charter vessel from the UK, which diverts to Mar del Plata. Government also purchases its gasoline requirements from FIC.

Gas oil/diesel is delivered in bulk in Royal Fleet Auxilliary tankers into the large tanks on the north side of Stanley harbour. Government, FIC and BAS purchase their requirements from these stocks, FIC again being the distributor and retailer of this fuel for private and business consumption. It is distributed around most of the settlements in bulk by the Monsunen, which has two gas oil cargo tanks as well as its own bunker tank.

Storage and stocks. The following table sets out the oil storage facilities in Stanley. Bulk gas oil storage tanks in the Camp are not included.

Table 54. Falkland Islands' Bulk Oil Storage Capacity
(tons)

	Gasoline	Avgas	Gas Oil/Diesel	Avtur
FIC	Drums		200	
Government	Drums	22	2,700	
BAS	Drums		1,500	
MOD (Navy)	-		15,600	
Total	-	22	20,000	
YPF tankage	110		300	121

Source: FIG.

All gasoline is stored in drums, as is also a considerable quantity of avgas.

The present ad hoc supply system of gasoline and avgas from YPF has proved to be extremely unreliable at times. Ordered drums are not always loaded at Mar del Plata and as a result, stocks of avgas and gasoline have at times both been greatly run down. Avgas stocks were last year supplemented by a shipment from Punta Arenas on the Monsunen and they now stand at a year's supply. As a result of a lack of clearly stated government policy on fuel stock levels and an apparent misunderstanding with FIC, gasoline stocks also ran dangerously low in early January 1976. The situation with regard to gas oil/diesel stocks is clearly one of over abundance by virtue of the presence of Admiralty storage.

Also shown in Table 54 above is the tankage capacity in the YPF bulk oil terminal built under the terms of the Supply Agreement. The storage is made of 27 x 25 cubic metre tanks, which can be used for different fuels as necessary. On current allocation 66 per cent of tank capacity (at an average stock level) represents approximately 7-8 months' supply for the Islands' gasoline requirements and 3-4 months' non-Government gas oil requirements. Most consuming countries are now adopting a policy of 90-120 days compulsory stock requirements so that the YPF storage capacity would conform with that requirement quite adequately. Allegations that YPF, as a branch of the Argentinian Defence Ministry, intended the tankage to be a strategic naval bunker storage cannot be justified on the size of the tankage built. A two thirds' stock level of this tankage would hardly fill one frigate's bunker tanks.

Prices. Movements of the retail price of the two principal fuels over the last five years are shown in Table 55.

Table 55. Average Retail Prices of Oil Fuels, 1971-75
(pence/gallon)

	1971	1972	1973	1974	1975	1976*
Gasoline	50	33	69	107	170	85
Gas Oil/ Diesel	15	13	15	32	34	47

* February 1.

Source: FIG.

The tremendous fluctuations in the gasoline price, reflect the ad hoc nature of the supply arrangements. Over the same period world bulk prices of gasoline went up approximately six times, and in the UK retail prices of regular gasoline rose from roughly 30p to 70p/gallon.

The increase in gas oil prices is approximately related to the rise in the bulk price of the fuel delivered by the Admiralty.

Table 56. Average Bulk Price of Gas Oil/Diesel Delivered from Admiralty Stocks, 1971-75

	1971	1972	1973	1974	1975
Price £/ton	19.00	21.40	21.30	21.80	71.00

Source: FIG.

The fact that this price contains a very large freight (RFA) element -about £12 a ton in 1971 - helps to explain the difference between these price rises and world bulk oil price movements.

All the retail prices contain a 33 1/3 per cent retail margin imposed by FIC. In the case of gasoline, this would have varied from an average of 8p/gallon in 1972 to 42p/gallon in 1975. In the UK, Outer Zone distribution costs plus retail margin is around 6-7p/gallon. While handling of drums rather than bulk fuel is certainly more costly, FIC's margin (which the Colony management have the authority to lower if seen fit) clearly became excessive, linked as it is to a price unrelated to FIC's costs.

The sensitivity of consumer demand to gasoline prices is illustrated in Table 57.

Table 57. Price Sensitivity of Gasoline Consumption, 1971-1975

	1971	1972	1973	1974	1975
Price - p/gallon	50	33	69	1.07	1.70
Consumption - tons	196*	200*	133	125	81

* Very approximate.

Source: FIG.

In some camp settlements prices are higher to cover the coastal shipping and handling costs. The decline in total consumption may be partly due to the increased number of diesel landrovers (mainly company owned) in the last few years. Price increases have a marked effect on leisure travel. This can be demonstrated from the example of two settlements within 1½ hours drive of each other, i.e. about 12-30 miles depending on driving conditions. Taking landrover fuel consumption as 1 gallon an hour, the cost of the round trip would have varied from about £1 in 1972 to over £5 in 1975.

YPF agreement. The original Agreement was signed on September 13 1974, as a follow-up to the 1971 Joint Statement on Communications between Argentina and the UK Government. This Agreement provides for the supply of the Islands' oil product requirements. It has not yet been implemented due to the failure (as yet) to reach agreement over the exchange rate and because of the lack of an acceptable jetty or other means of pumping oil fuels into shore tankage. The main points of the Agreement between the Argentine state oil company, Yacimientos Petroliferos Fiscales and HMG are:

i. YPF will have supply and marketing rights of petroleum products to all Falkland Islands' consumers, except the following: Falkland Islands Government, MOD, British Antarctic Survey, Johnston Construction Limited and bunkers.

ii. The products included are gasoline, gas oil/diesel, kerosene, aviation fuels, lubricants and asphalt.

iii. YPF have built bulk storage, described in the previous section, for gasoline, diesel/gas oil and jet kerosene.

iv. The Argentine Government may construct and maintain a jetty for handling bulk oil products should it deem it appropriate. Responsibility for its construction has now been taken on by the UK government.

v. Prices paid for products will be those in force on the Argentine mainland. It was only recently agreed that these will be converted to sterling at the quoted financial[1] exchange rate if not paid in pesos.

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1 With the March 9 peso devaluation the old distinction between 'financial' and 'special' exchange rate has been abolished.

vi. The Petroleum Ordinance covering this Agreement, comes into force on a date to be notified by the Governor, and becomes operative following an agreed lapse of time.

vii. The Agreement runs until December 31, 1976, after which it can be terminated subject to six month's prior notice in writing.

Much criticism has been levelled at the monopolistic terms of this agreement, though this arises largely because the Argentine Government is the supplier, rather than because of the actual terms of the Agreement. In fact, although it was undesirable and unnecessary for the packaged specialist products, in particular lubricants, to have been part of the Agreement, a fuels supply agreement with an oil company would almost certainly have covered the supply of diesel as well as gasoline, and any trade negotiated supply agreement would have covered the Islands' entire requirements for these products. At the time it was signed, the two year length of the Agreement was not atypical of supply agreements of this kind. In other words, the monopolistic constraints placed upon the buyer by this Agreement would probably have also existed in large measure under a commercial supply contract with an oil company.

On the positive side, YPF was prepared to build the bulk oil storage required. Although it could be argued that only gasoline facilities were needed, since Stanley already possessed sufficient gas oil storage, and the avtur tanks for LADE (Argentinian air force service) would have been constructed anyway, gasoline storage (about 200 tons) and retailing facilities would have had to have been built, at the cost of at least £25,000, not including the cost of the jetty.

But potentially the most attractive element was the price of the fuel offered. Based on current (February 1976) Argentinian retail prices -there is no distinction between different areas of the country - and the March 1976 exchange rate of 272 pesos/£1, the following represent the selling prices of the fuels under the terms of the Agreement.

Table 58. Oil Product Prices Under YPF Agreement

	Super Gasoline	Diesel	Kerosene	Gas Oil
Argentinian price pesos/litre	31	12	16	16
Converted Falkland Islands price pence/gallon	52	20	27	27

Source: Foreign and Commonwealth Office.

If the Government were to make available to the public pesos at the going market rate the effective prices would of course be cheaper still. Comparing these prices with those currently being charged, see Table 55, gasoline would be 23p/gallon, diesel 21p/gallon and kerosene 45p/gallon cheaper.

For comparison with a theoretical alternative supply source, delivered prices[1] in Chile in October 1975 were approximately 68p/gallon for gasoline, 45p/gallon for kerosene and just under 40p/gallon for gas oil. So that although the apparent price differential for gasoline is not very great, the price advantage of the YPF agreement supply is considerable for diesel/gas oil and kerosene. Adding a freight element from Chile would increase the price differential by a further 2-5p/gallon.

Based on current world prices and assuming an offer would be forthcoming from a commercial oil company, delivered product prices in the Falkland Islands, are estimated to be in the range of 40-50p/gallon for gasoline and some 35-45p/gallon for diesel oil. So again the price advantages of the YPF agreement apply only to the diesel/gas oil and kerosene supply. Nevertheless, it would represent an annual saving of approximately £100,000 to the Islands' economy assuming Government (but not marine bunkers) requirements were also supplied under this Agreement. If Government continued to receive its gas oil/diesel from MOD, the net savings for the private sector would still amount to some £35,000 per annum.

However the question arises as to how long the price benefits of this Agreement might last considering the present rate of Argentina's internal inflation, the size of its government budget deficit and its dependence upon foreign oil imports.

1 Based on information supplied by Bank of London and South America.

i. In the past, internal inflation, even at over 400 per cent over the last year, has been more than offset by adjustments to the financial exchange rate to maintain Argentinian competitiveness in world markets.

ii. Gasoline is already heavily taxed (at a level comparable with that in the UK) so that it is unlikely that the tax element will be very substantially increased, though the possibility cannot be ruled out. Diesel/gas oil is likely to have only small excise tax increases imposed, as it is essentially an industrial fuel.

iii. Elimination of Argentina's oil deficit (currently about 16 per cent of domestic consumption) is planned by 1977. Although this seems unlikely, the deficiency is unlikely to exceed 30 per cent at worst and if the new exploration programme in the Austral Basin bears fruit, it could be wiped out altogether in the early 1980's.

Overall, the conclusion is that although some price increases under the YPF Agreement are probable, they should not be excessive.

Oil jetty. Construction of a new jetty to receive bulk oil products into the YPF storage is the subject of a study by the consulting engineers Rendel, Palmer and Tritton.[1] Their initial recommendation was to build a 500 ft rock filled causeway opposite the YPF storage terminal east of the town, with two outlying mooring dolphins at an estimated cost of £160,000.

The team suggests that another possibility is a simple (as opposed to an elaborate exposed location mooring buoy system) monobuoy system supporting two or possibly three floating 4-6 inch hoses, linked to the shore. This system is used to supply small settlements in the fjords of Norway, Iceland and southern Chile. Its reliability is well proven and the cost is unlikely to exceed £50,000. Three hoses should represent the maximum, since avgas and motor gasoline can be discharged down the same hose (the hose contents always being pumped into the motor gasoline tanks). In many terminal operations, avtur (kerosene) and gas oil are also discharged down

1 This followed on recommendation of the 1975 Pencol report which concluded that use of the East (FIC) Jetty for carriage of petroleum fuels constituted a fire hazard.

the same line, with the contents being pumped into gas oil tankage. In the Falklands, this operation would enable the hoses to be limited to two lines.

SERVICE INDUSTRIES

Hotel and other short-stay accomodation

In Stanley there is one 27 bed hotel of modest standards, and six guest or boarding houses. Most of the latter are little more than private homes which take paying guests. In the camp there is no such overnight accomodation. Government or official visitors are usually accomodated in managers' houses; other visitors have to stay with friends or relatives. A few managers in some of the attractive Islands are now beginning to take local and overseas tourists as paying guests in their own and otherwise unoccupied houses on their farms. Accomodation facilities for visiting camp stations are much reduced since the withdrawal of SS Darwin which toured the islands and had some passenger accomodation.

The hotel in Stanley caters mainly for tourists, business visitors from overseas, and new arrivals to the island awaiting permanent housing. Occupancy rates are very low (21 per cent in 1975) due to the nature and undeveloped state of tourism (see Chapter 12). The guest houses also occasionally cater for tourists, their main business is from workers with a short to medium-term assignment in the islands and from visitors from Camp, mainly newcomers who lack personal contacts in Stanley. Other visitors from the Camp to Stanley normally stay as guests with relatives or friends, often paying a fixed sum per person per night.

If the permanent airfield is extended to facilitate economic development (see Chapter 10), provision of additional hotel accomodation of reasonable standards will be needed. This would be best provided by private enterprise, preferably a Falkland Islands registered company although backing by a hotel group or airline is likely to be essential. A feasibility study by the investors to identify the potential demand by tourist and business visitors and the necessary facilities would be required - see Chapter 12, Tourism.

Restaurants and bars

Restaurant facilities are limited to the hotel and a coffee shop run as a part-time business.

In addition to the hotel there are three other bars and two clubs with bar facilities. For its size of population Stanley is adequately provided with drinking establishments. They play a significant role in the social life of the town, not only for residents but also for visitors from the Camp.

Building and mechanical contractors

Apart from the Public Works Department and the work of Johnston Construction on the new airfield (see Chapter 10), there are five contractors in Stanley who provide building, painting and general handyman services. Only two are significant employers of labour, the numbers varying according to the work load. Currently both sub-contract to Johnston Construction. Most of the work carried out is in the nature of repair and maintenance of private houses, although some structural alterations, major renovations and the occasional house construction does take place. Largely because of the relatively static population in Stanley (but see Chapter 14) there has been little effective demand for new houses. Aggregate turnover of the five contractors totalled £36,600 in 1972, £28,600 in 1973 and £49,650 in 1974. Much house repair and maintenance work is carried out by owner occupiers on a do-it-yourself basis.

At the farm settlements all construction and maintenance work is carried out by the farm. In some cases employees maintain their own houses as part of their paid employment.

Banking

Banking facilities in the Falkland Islands are of a basic, rudimentary kind. They are provided by three bodies:

1. The Falkland Islands Company.
2. Estate Louis Williams.
3. The Treasury.

FIC acts as local banker to many of the farming companies, partnerships and individuals. The company offers current account facilities, and customers can draw cheques on their account with FIC. FIC has a correspondent commercial bank in the UK and it provides its customers with a remittance service. Foreign Exchange facilities are also provided.

The Estate Louis Williams provides a similar range of services.

The Treasury provides a remittance service, a cheque-cashing service and foreign exchange facilities. The Government, of course, also runs the Savings Bank which is used by Falkland Islanders rather as the Post Office Savings Bank is used in the UK. The Savings Bank is run on the same lines as the POSB, and 3½ per cent interest (tax free) is paid on deposits (see Chapter 3).

There is a great need in the Falklands for proper commercial banking facilities. In particular, there is a need for overdraft and loan facilities for both personal and business purposes. It is very difficult to raise money in the Falklands at present. The Government makes loans from very limited annual allocations, mainly to individuals for house purchase. FIC also occasionally makes loans. But these sources are quite inadequate if people are to be encouraged to start new businesses.

Sound financial advice is also generally lacking in the Falklands, and an experienced bank manager would be able to provide this missing ingredient. It is not only the aspiring small businessman who needs advice, but also the individual with investments or financial problems.

Many Falkland Islanders at present have current and deposit accounts with banks in the UK. A local commercial bank could well bring substantial funds back to the Falklands, and thus become an effective means of mobilising local savings for investment in the Islands.

Other services

One aspect of life in the Falklands is the pronounced do-it-yourself approach to activities. Consequently, the range of service industries is limited, and those that exist are one-man, part time businesses restricted to Stanley. Although currently of very minor significance in economic terms, the community does need the services performed. Some of the businessmen constitute the Island's entrepreneurs who could play an important role in any development. Two main categories can be distinguished.

Transport. Transport services consist of five hauliers and one taxi service. The haulage activity is mainly connected with the transport of peat from the peat beds on the Stanley Common. Two of the hauliers will also cut peat if required (see also under Fuel Supplies in this Chapter). There are also two part-time motor mechanics who, in the absence of a garage, under-take vehicle maintenance and repairs. Many owners however, maintain and repair their own vehicles.

Personal services. These comprise a dressmaker, hairdresser, barber, laundry and photographer; there being in each case one part-time business. There are two journals, one annual and one monthly, produced on a part-time basis.

Conclusions

There does seem to be scope for improving the quality and range of services. The need for such improvement will increase, assuming the economy expands, particularly in areas such as building, vehicle maintenance and repair, road transport haulage (if roads are constructed), local newspaper, dry cleaning and shoe repair.

CHAPTER 12 - TOURISM

EXISTING SITUATION

Tourist visitors

The number of tourists visiting the Islands in recent years is set out in Table 59 below.

Table 59. Tourist Visitors to Falkland Islands, 1971-1975

Year	Arrivals by sea	Arrivals by air*	Total*
1971	419	-	419
1972	1,520	-	1,520
1973	3,189	200	3,389
1974	3,999	501	4,500
1975	6,261	350	6,611

* Figures for 1971 and 1972 exclude tourists arriving by air but numbers are thought to be small.

Source: FIG.

Four types of tourism can be identified:

1. Cruise ships. For a number of years cruise ships of various nationalities have made one day visits to Port Stanley. Excluding the "Lindblad Explorer" (see para. 2 below), the number of cruise ship visits has increased as follows:

1971	1
1972	2
1973	5
1974	5
1975	9

The visitors in this category make up the large majority of tourist visitors given in Table 59.

In every case, the ships called for one day, or part of a day only, providing their occupants with a few hours on shore for sight-seeing and shopping. The attraction of shopping was the favourable peso/£1 exchange rate operating, which was well below the free market rate, especially from 1973 to early 1975. During the 1975/76 summer the rate of exchange was changed to the free market rate, with the result that this kind of 'tourist' trade has dropped sharply. The ships have been of various national registrations - Spanish, Italian, Panamanian, Argentinian - but in the main the tourist visitors were from Argentina and, to a lesser extent Brazil. Visits took place during the four summer months of the year, December to March.

2. Air 'tourists'. This describes those Argentinian visitors who used to fly into the Islands to take advantage of the exchange rate. The drop in 1975 reflects the change to the less favourable free market rate.

3. Wildlife tourism. This has taken two forms; short-stay day visits from a visiting ship, and tourists arriving by air and staying for one to two weeks. Lindblad Travel Incorporated of New York pioneered the former by including the Falkland Islands in their ship-based Antarctic Tourist Expeditions from December 1972 onwards. These are high-cost, guided package tours of $3\frac{1}{2}$ or $4\frac{1}{2}$ weeks duration which attract a wealthy clientele interested in wildlife, particularly birds. The "Lindblad Explorer" starts in Tierra del Fuego, and completes a round trip of the Falkland Islands, the Antarctic Peninsula and (once a year) South Georgia. An estimated 800 Lindblad tourists have visited the Islands since the programme was initiated. The 1975/76 programme comprises 4 cruises, all of which include 4-5 days in the Falkland Islands' waters. In addition to a short stay in Port Stanley, there are day visits to 3 or 4 farm settlements (mainly on Islands) for wildlife viewing and general sightseeing, for which a per passenger landing fee is paid to the farm. The longer stay visitors arrive by the weekly air service from Comodoro Rivadavia. A few have come on private trips, in some cases through contact with the Islands' only hotel in Port Stanley. The others have come on tours organised by common interest groups, such as wildlife societies, in contact with a local operator. The latter provides, or arranges simple accommodation on New Island for parties of up to 15, travel by the internal air service and accommodation at the hotel in Stanley. Three or four groups were expected in the 1975/76 season.

4. Other visitors. There have been a small number of other tourists mainly relatives, friends or acquaintances of Island residents; some have been attracted by the trout fishing. A limited number of private yachts have also called at Stanley.

No accurate record or survey of tourist spending has been made; an average of £4-£5 per head per visit is judged a reasonable estimate on the basis of discussions with local shopkeepers.

Tourist facilities

Investment in tourist facilities has been very small, except for the hotel which of course caters for all kinds of traveller. Government expenditure has been minimal, although the Government-appointed Tourist Advisory Board (established in 1972) has recommended provision in Stanley of facilities such as a currency exchange office, improved landing arrangements at the public jetty, shelter on the jetty, tourist information boards etc.

There has been some small expenditure on tourism (but no effective overseas publicity) and sums have been set aside as tourism loans[1]. So far, less than £10,000 has been taken up by private entrepreneurs, mainly to provide or improve accomodation. The Government has urged investment in tourist accomodation at settlements but, so far, new building and renovation has occured on only one farm. Retailers have of course increased their purchases of luxury goods to cater for the tourist trade.

A number of constraints have combined to account for the low degree of activity:

- the lack of specialist know-how about tourism development within Government and on the part of any local private entrepreneur;

1 £30,000 to be met from UK Aid.

- the requirements for all visitors to the Falklands passing through, or coming from, Argentina to possess a white card[1];
- the absence of knowledge about tourist potential and therefore any long-term plan for tourist development;
- doubts about the desirability of having "too many tourists";
- with the exception of Lindblad Travel, the absence of interest by any airline, hotel company or tour operator in touristic development in the Islands.

It must be emphasised, however, that neither Government nor private enterprise has been totally uninterested: both have been constrained by lack of staff and funds and by uncertainty about the scope and benefits of tourism. In these circumstance it is not surprising that the general attitude has been to defer decision and action.

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1 This can take up to 3 weeks to obtain and Argentinians often experience delays of 2-3 months.

DEVELOPMENT POTENTIAL

Tourist attractions

The Falkland Islands do not offer what would normally be considered mainstream tourist attractions. However, the tourist industry is catering to increasingly wide tastes and the Islands possess sufficiently attractive features to draw visitors. These are:

1. Geographical and human characteristics. The Islands have a reputation for bleakness because of the high average winds and absence of trees. However, they are no more so than the moorlands of central Wales, and many Scottish Islands; and although cooler, they may have the advantage of a drier and sunnier climate but with more rapid variations in the weather. Although some of the scenery is monotonous, there are numerous islands, sandy beaches, rocky cliffs, capes, bays, and estuaries, which provide greatly varying sea and landscapes whether viewed from the sea, the land or the air. Particularly attractive in this respect are the islands off the North, West and South coasts of West Falkland, which also have the advantage of being much drier, sunnier and generally warmer than the Stanley area. The great distances between settlements and the sparse population provide a sense of isolation and of encounter with the "wilderness" which is appealing to some. The maritime climate, although cool, provides the islands with a potential seven month season from October to early May.

In human terms, there are also points of interest; an isolated archipelago, remote from Britain, and without any indigenous population, settled by people of British stock; the general "Englishness" of the culture and way of life; the hospitality to be enjoyed, particularly from those in the Camp settlements; the enigma of whole islands occupied by only two, and sometimes one family, yet keeping in contact through a radio telephone system.

2. Wildlife. There is an abundance of wildlife in the islands; over 60 different varieties of breeding birds and some 80 non-breeding visitors mammals are mainly from the sea and include seals, sea elephants and sea

lions. However on land there are to found guanacos, hares, foxes and even wild cattle. Although the breeding species are not numerous, the populations of birds are large. Of greatest interest to the tourist are the penguin rookeries - Rockhopper, Gentoo and Magellan being very common, but King and Macaroni exist in small numbers, the large breeding colonies of albatross and other sea birds, the seals and sea lions and the ubiquitous upland goose. A particularly valuable characteristic of practically all the wildlife is their profusion on some of the more scenically attractive islands.

The Falkland Islands have a history of wildlife depredation by way of sealing, whaling, the short-lived penguin oil industry, and egg collection. Although sealing lasted until the early 1960s, these activities have virtually ceased. Moreover, in the early years of the Colony there was serious and extensive destruction of coastal and island stands of tussac grass by uncontrolled sheep and cattle grazing, yet tussac is a most important habitat for sea birds and some mammals too. (Farmers now realise the value of tussac as winter feed so that protection and some replanting are now the rule. Some remaining tussac areas are, however, being attacked by disease.)

3. Sporting and outdoor activities. There is a scope for a wide variety of sporting and outdoor activities, all of which appeal to limited numbers, including:

Trout fishing;
Shooting (geese and ducks);
Horse riding;
Pony-trekking;
Walking tours;
Sailing;
Rock climbing.
Scuba diving (particularly around the many sunken wrecks).

Trout fishing is about the only activity which has so far attracted tourists. Fishing in about six of the small rivers on the island can be good but only for a limited period - usually October, November, March and April. As mentioned in Chapter 7, the small size of the rivers, as well as the short duration of the period of good catching (the actual season runs from October 1 to April 31) severely limit the scope for attracting many overseas tourists.

In general these activities would not by themselves attract tourists, but they are pursuits for visitors who come for other reasons. Properly developed they would provide a useful income to those farms with the necessary attractions and basic accessibility, which make a conscious and planned effort to diversify into the "country holiday" market.

4. Base for visits to South Georgia and the Antarctic. Stanley is a potential base for tourist voyages to South Georgia and the Antarctic Peninsula, with tourists arriving by air from America or Europe. The tourist vessels would draw stores, fuel and water from the Falkland Islands, for the duration of the tourist season, namely December to February or March. Stanley is likely to be as good a base as Ushuaia (Tierra del Fuego) for tours to the Antarctic, and better for South Georgia. Tours to these areas are likely to be limited to the specialised high cost tourist market, but are likely to appeal because of the excitement and adventure of seeing places once the preserve of the intrepid explorer.

Sir Ernest Shackleton's grave in the little whalers' cemetry in Grytviken is a place of particular interest. The abandoned whaling stations too have the strange appeal of a ghost town. But the magnificence of South Georgia must first be in its mountain and glacier scenery and the spectacular profusion of its wildlife.

Constraints

As well as the lack of hotel accommodation and other facilities there are other major constraints on tourist development.

1. External air service. As explained in Chapter 10, the limited runway length prevents air travel from further airfield than Comodoro. So long as flights direct from Buenos Aires and other major southern South American cities are unable to land at Stanley, potential growth of tourism will be very much restricted. This also applies to tourist trade on inter-continental charter flights from other parts of the world which are unable to make convenient connections at Buenos Aires, Montevideo etc.

2. Internal Islands' transport. The current internal air service cannot cope with any significant increase in tourist load. This and the lack of roads and other means of sea transport would also prevent the growth of tourism, in so far as the main centres of wildlife attraction are in the further flung small islands and peninsulas. For tourism to develop, it would be necessary to be able to travel easily, not only from Stanley to these places, but also if possible between the centres of attraction.

3. Promotion. Very little has taken place hitherto, even in Argentina.

4. Conservation pressures. Tourism and wildlife need not be incompatible. While other constraints may well limit tourism to levels which will not threaten wildlife, it will be necessary to develop proper controls.

Potential tourist demand

This survey of the potential demand for tourist visits to the Falklands is based on desk research, combined with interviews of tour operators and travel agents mainly in the UK. The review considers briefly the main sources of tourists by geographical market and also the future for wildlife tourism which, we argue above, is the main area of interest.

Argentina and other South American countries. Tourism is well developed in Argentina and for certain segments of the market, particuarly amongst the

middle and upper classes, the Falklands, both as a location and for its wild life attractions, are likely to have considerable appeal. Tierra del Fuego, whose scenery, climate and wildlife are somewhat similar to those of the Falklands, receives 40,000-50,000 visitors a year[1]. However Tierra del Fuego does have a greater variety of scenic attractions. These include mountains, glaciers and forests. It also possesses a road network.

USA and Canada. The USA alone already generates over half a million tourist visits a year to South America, including 50,000 to Argentina, and 20,000 each to Uruguay and Chile. Many of these journeys involve multi-country visits and the addition of one more would be relatively easy and an added attraction to many package holidays. The US and Canadian markets[2] contain a substantial number of keen wild life and other special interest enthusiasts, many of whom are prepared to pay premium prices for "off the beaten track" holidays.

UK and West Europe. The main source of interest would be amongst special interest tour operators for this growing segment of the tourist market. Tours are already arranged to such places as, the Galapagos Islands, Nepal, Baffin Island, Ethiopia, and Reunion. Cost competitiveness for this type of tour is much less important than personal attention and the unusual. Specialist tour operators[3] consider that the Falklands would be a suitable destination, perhaps in conjunction with other countries, but numbers are never likely to be large.

Other countries. There is also the prospect of significant interest in tours to the Falklands from a number of other countries, particularly Japan and South Africa. In both these countries interest in wildlife and photography is well developed and widespread; both can be effectively combined in wildlife viewing in the Falklands.

Wildlife tourism. Interest in holidays which permit the viewing (and photography) of wild animals and birds in their natural habitats has been

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1 54,000 in 1973, of which 29,400 travelled by air, and a total of 40,700 in 1974. 2 One tour operator which specialises in holidays for ornothologists estimates that, given suitable facilities in the Islands and promotion in the US and Canada, 2,000-3,000 tourists a year would visit the Falklands from North America. 3 Nine such UK operators are currently running 75 separate tours of a nature comparable to a Falklands tour for prices generally between £400 and £900 a person and a duration of 2-3½ weeks.

growing rapidly since the early 1960s. The number of wildlife tourist visitors has tended to expand in line with the provision of suitable facilities for accomodation and travel. Undoubtedly, the greatest attraction is East Africa. Kenya alone recorded 220,000 visitors in 1974. Because of the growing numbers of wildlife tourists, many tour operators are keen to open up new destinations and locations.

Whilst the birds and mammals of the Falklands clearly hold a narrower appeal than the big game of East Africa, these numbers indicate the level of interest in wildlife tourism.

The uninhabited islands of the Galapagos in the Pacific, admittedly situated in a warmer climate and with a more exotic range of wildlife, receives 8,000 visitors a year in cruise ships after only five years development. The maximum acceptable has been fixed at 12,000.

Possible demand

Based on the preceding evidence of certain specialist tourist demand in different areas of the world, Table 60 indicates possible tourist visits to the Falklands (excluding day visitors from cruise ships), after a period of development lasting 5-10 years. The figures cover all forms of tourism, although wildlife is likely to form the major attraction. They should be regarded as orders of magnitude, assuming that accomodation will be provided and that there are no constraints on travel to and from the Islands. It must be emphasised that these figures do not take account of environmental, ecological or social objections to visitors in these numbers.

Table 60. Indications of Approximate Potential Demand for Tourist Visits to the Falkland Islands, after Development Period

Origin	Annual visits
Argentina & other S. American countries	3,000
USA and Canada	2,000
UK	200
Europe	600
Other countries	200
Total	6,000

Source: Team estimates.

Possible locations

Given the controls mentioned above, the areas with the best potential for wildlife tourism (there may well be others, however) are considered to be:

New Island;
Westpoint Island;
Jason Islands (Steeple and Grand);
Carcass Island;
Bleaker Island;
Volunteer Point;
Sea Lion Island;
Cape Dolphin;
Bull Point;
Seal Point, Port Harriet.

In most cases, they combine a varity of species (in some instances in very large numbers), reasonable accessibility by air or sea and attractive scenery.

The Jason Islands group have a fine potential as one of the richest areas of Falkland wildlife. Now without sheep and in the ownership of a UK bird sanctuary operator, the Jasons are effectively a wildlife sanctuary cum nature reserve. Although they could support tourism, at least in moderate numbers, the problems of access might, in practice, hamper such development.

In addition farms in attractive locations on East and West Falkland would also have some tourist appeal.

Development

Clearly not all the constraints can be lifted at once. For example the "white card" restriction is outside the control of the Falkland Islands government, and the improvement in internal transport facilities can only be gradual. However there is no reason why the industry should not develop gradually and indeed this is probably desirable. It would be necessary to develop the following:

1. A hotel in Stanley. This is discussed in more detail under 'Hotel Restaurants and Bars' in Chapter 11 under Service Industries.

2. Chalets. Construction of simple chalets or lodges, at wildlife sites on islands or peninsulas would cater for visitors staying for periods varying from say 5 to 10 days. Access from Stanley would be either by aircraft or by bus, and/or fast vessel (see Chapter 10 Transport, under development potential of coastal shipping). These particular tourist developments lend themselves to major participation by local interests, in partnership, if necessary, with overseas tour operators who can bring in valuable expertise. Opinions differ as to the amount of chalet accommodation which could be provided at the main sites. Some tour operators consider that accommodation for up to 60 or even 100 would be acceptable and that with less than 40 commercial viability would be doubtful. However, it is recommended that at least, in the first instance, accommodation for not more than 30-40 should be provided at any one site. Each site would need a lodge manager who would need to be knowledgeable about wildlife, or employ guide(s).

3. Ship-based tours. A suitable vessel (possibly part of an enlarged coastal shipping service - see Chapter 10) based on Stanley could tour the Islands stopping for one or more days at selected wildlife locations. On the basis of current experience of visits by the Lindblad Explorer (up to 90 visitors) rather more visitors could be catered for than would seem acceptable for a purely land-based operation. Assuming a suitable vessel could be chartered, a more rapid development of tourism could be achieved by this means than with 1. or 2. above.

In practice, there is no reason why a combination of these options should not be adopted and this would seem the most likely course of events.

Sporting and outdoor activities, general sightseeing, and shopping are likely to form the other tourist activities either in conjunction with wildlife viewing or separately. A hotel of Stanley could provide the base for all three, with day visits (or overnight stops) to locations for fishing, walking, riding, shooting, viewing farm operations etc.

Costs and benefits

At best, the foregoing indicates possible tourist development and attendant orders of magnitude. However, we do not consider it unreasonable to contemplate tourism developing to 5,000 visitors a year, and therefore to explore the economic implications of that number.

World average figures show that visitors on a 7 to 10 day stay spend £150 per head (excluding air travel) at current exchange rates. This is probably not inappropriate for the Falklands, since expenditure on internal travel would compensate for the limited range of purchasable goods. The retention factor of tourist expenditure for undeveloped small islands can vary from about 30 to 70 per cent. While it is probable that the Falklands would need to import most of its consumables for the tourist industry, the nature of much of the investment in chalets, farm lodges etc should mean that a significant share of this investment will be supplied by local interests. It is estimated therefore that the retention factor of tourist income would be about 45 per cent.[1] On this basis total income for the Islands would be about £340,000 -equivalent to a 14 per cent increase in value added to current Gross Domestic Product.

At the level assumed above tourism would provide anything from 60-80 private sector jobs, of which initially some 70 per cent could be recruited locally. There is no reason why with training this percentage might not be larger. In addition a local tourist office together with ecological adviser(s) might create a further 3-5 jobs. A further 20 or so jobs might also eventually be expected. While there is no surplus labour currently in the Falklands these job numbers represent a long term target with a gradual build-up. They should also be seen as presenting a diversification of job opportunities with a high proportion being taken by women.

The private sector investment in accommodation facilities which would be needed to support a tourist industry at the level described is estimated to be in the order of £2-2.5 million. Care will be needed in striking the

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1 See Appendix 2.

correct balance between investment in chalet type facilities at the locations of wildlife interest, and the hotel in Stanley, which would be more expensive. The latter is unlikely to be justified solely by tourist visits. Until a more detailed feasibility study on the likely capital and running costs of a hotel in the Falklands is undertaken, it is not possible to be precise about the size and number of hotel(s) required in Stanley.

CONCLUSIONS

Provided the constraints listed in the earlier two sections are removed, there is the potential for a considerable growth in tourism in the Falkland Islands, chiefly based on its wildlife attractions. The eventual value of an established tourist industry to the Falklands' econony could represent an increase of 14 per cent to the Islands' income.

The most important constraints are the lack of hotel accommodation, the length of the runway and the lack of promotion. There would seem no reason why tourism development should be constrained because of conflicts with wildlife interests, so long as proper controls are established. The means of achieving necessary control are given below.

Methods of control

a. The number of visitors to tourist sites can be controlled by the capacity and type of facilities provided; sheltered observation hides may need to be provided at some locations.

b. Limiting the number of visitors to a rookery or colony at any one time may be necessary. However fixing general limits is not easy because of factors such as the size of colonies and the differing reactions of species; this should be a matter for advice by wildlife ecologists.

c. Good behaviour of visitors can be ensured by observation of a code of conduct and adequate guidance from local workers or trained personnel.

d. Visitors can be excluded from nature reserves[1] as a general rule, although exceptions could be made e.g. for relatively small numbers of ornithologists. It may be appropriate to create further reserves.

e. If the industry develops to a substantial degree, the establishment of a system of ecological monitoring[2] to measure the effects of tourism may need to be introduced.

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1 There are some four designated nature reserves all on small islands where farming is precluded. In addition there are some 17 wildlife sanctuary areas where fauna is protected but farming can continue.
2 This could be undertaken by ecologists from a university or the British Antarctic Survey.

The application of most of these controls should be the concern of a wildlife ecologist - see Chapter 19 under Environmental Control.

CHAPTER 13 - PUBLIC UTILITIES

POWER SUPPLIES

The situation in Stanley is quite different from that of the Camp and will therefore be treated separately.

1. Stanley

Supply/ demand. Electricity is supplied from a diesel engine power station installed in 1972 with a total rated generating capacity of 1,276 kilowatts, consisting of 2 x 488 kw units and 1 x 300 kw machine. There is floor space for further expansion if required.

Consumption by main consumers in the four years 1971/72-1974/75, is given below.

Table 61. Electricity Consumption in Stanley, 1971/72-1974/75
(In '000 Elec. Units)

	1971/72	1972/73	1973/74	1974/75
Royal Marines	255.6	221.5	223.3	162.9
Government Depts.	822.0	755.7	663.0	581.1
Cable & Wireless	58.8	53.9	60.0	131.4
ESRO*	223.3	237.6	181.5	-
Science Res. Council	130.0	95.4	50.7	54.3
BAS*2	174.5	190.5	196.9	132.7
FIC	74.5	79.0	75.1	84.4
Johnston Const.	-	-	-	19.5
Domestic/other	923.9	648.6	1,053.5	503.9
Total	2,661.6	2,228.2	2,504.0	1,670.2

* European Space Research Organisation closed in 1974.
*2 British Antarctic Survey.

Source: FIG.

The notable feature of consumption is the domestic sector where consumption fluctuates an enormous amount, causing its share of total demand to vary from 42 per cent down to 28 per cent. By comparison with other developed countries, this is quite a low share of total consumption and reflects the relatively high expense of electricity compared to other domestic fuels. Peak power requirement in winter is about 745 kw with minimum of around 200 kw.

The fluctuation in annual domestic consumption is related to the electricity tariff charged.

Table 62. Relation of Domestic Electricity Consumption to Tariff

	1971/72	1972/73	1973/74	1974/75	1975/76(proj)
Domestic consumption - units	923.9	648.6	1,053.5	503.9	600.0
Tariff in pence/unit	1.87	2.30	2.30	4.09	4.34

The big increase in tariff in 1974/75 caused about a 50 per cent drop in consumption from which, on half yearly evidence for 1975/76, it is only very slowly recovering. So that for the forseeable future, annual electricity consumption is unlikely to exceed even the 1971/72 level of demand. Allowing for maintenance downtime, there is currently sufficient generating capacity to absorb a 30 per cent increase in peak electricity demand over current levels. Any new large industrial consumer e.g. Alginates Ind. Ltd would need to generate its own electricity.

These fluctuations cause considerable variations in generating efficiency of the power station. The annual average efficiency of Stanley power station, based on the ratio of output to fuel consumed, varies from a minimum of 21 per cent (1972/73) to 34 per cent (1973/74). It demonstrates the difficulty of trying to adjust required output capacity with the three machines available to large fluctuations in demand, both at peak load and during average offtake, given that diesel engined generators run at rather less than their maximum efficiency at half their rated capacity.

Tariff. The drop in generating efficiency accompanying a fall in domestic consumption carries important implications for policy on imposing tariff increases. If the same overall station efficiency could have been achieved in 1974/75 (22 per cent) as in 1973/74 (34 per cent), theoretically it would have been possible to save £13,038. This figure compares with £29,900 which is the total amount of increased revenue from raising the tariff on the units sold. In other words the cost of the drop in efficiency,

caused directly by raising the tariff to cover increased operating costs, was almost half the extra revenue gained from the tariff increase. Should large increases in tariff i.e. 15 per cent or more, be contemplated in the future, this sensitivity to price should be borne in mind and the tariff increase estimated to be needed should be adjusted down by a factor of 0.7 to 0.8 to give the likely size in net revenue.

Under the existing Electricity Supply Ordinance a single tariff only can be levied. The Government is against a 2-part tariff, in which incremental units could be sold at higher or lower rates than the basic tariff. Part of its reasoning was based on the argument that the domestic consumption was so high a proportion of the total, that there was very little room for price manoeuvre. Currently Domestic/other consumption, as shown in Table 61, is only running at about 30 per cent of the total and its maximum in 1973/74 was 42 per cent.

We agree that this type of 2-part tariff would have no advantage. However, given the relatively low proportion of domestic consumption, the Government might well consider a different type of 2-tariff system, in which the domestic consumer is charged at a slightly lower rate than all other consumers, if ever it is necessary to pass on another large increase in fuel costs. Though this is contrary to the hierarchy in most tariff systems, it would have certain advantages in an electricity market where the domestic sector is highly price sensitive, as:

i. a majority of the cost increase could be passed on to the larger non-domestic sectors which are less price sensitive;
ii. unit overhead and operating costs would rise less rapidly if consumption is not so dampened;
iii. overall generating efficiency would be reduced less;
iv. though Government as a consumer itself would bear part of this price increase, overall the Government would not be increasing its budget deficit;
v. the differential would not need to be very large, and would be unlikely to inhibit private enterprise;
vi. some social benefits would accrue.

Waste heat utilisation. At maximum efficiency, diesel engined-generators can convert just over 40 per cent of energy input in the form of fuel to energy output in the form of electricity. The majority of the rest is lost as heat in the exhaust gases and in the jacket cooling water and a little in the alternator/generator itself. The question arises as to whether the high grade heat (approximately 70 per cent) in the exhaust gases through a heat exchange system could be utilised to heat a nearby installation e.g. swimming pool, greenhouse, hospital, etc. The main drawback is that there are three generating sets in the power station, which would need to have three associated heat exchanger units. These are highly expensive costing up to £8,000 each, and tend to have high associated maintenance costs. Therefore the conclusion must be that the cost of waste heat utilisation is too high to justify it compared to alternative means of providing heat for the installations described.

2. Camp settlements

Each farm settlement has its own centralised electricity generating unit to meet the farm's own requirements as well as those of the houses of the workers. Outhouses have their own generating units. Electricity is generated almost exclusively by diesel engines, which vary in capacity from 2-16 kilowatts and in number according to the size of the settlement. It is generally AC. The generators are operated in a manner decided upon by the farm management, but in general the policy is to restrict electricity generation to the following times:

i. dusk till 11 or 12 pm, and dawn to daylight in winter;
ii. one to two hours each morning to allow washing, vacuum cleaning etc. to take place; in some settlements they follow a practice of running the generators all day for one or two days/week instead of for a short time each morning;
iii. all day during shearing time for those farms using electrical shearers.

The most significant exceptions to this situation are at Fox Bay East, where there is a small Government-run generating unit, and Port San Carlos. In both settlements, diesel generators are connected to a bank of NiFe battery cells giving 24-hour availability of 110 volt DC electricity, though in both cases, the batteries are now getting rather old and in need of replacement. Where appliances require AC current i.e. those with electrical motors, converters have to be attached. It is also the case that Camp managers do not in general permit the use of high kilowatt appliances such as electrical fires and immersion heaters, which would be very expensive to run in any case.

Limitations on electricity use, largely unheard of in the remote settlements of Scotland's Western Isles, are generally accepted as part of Camp life. There is no doubt, however, that, at times, the inconvenience caused by these restrictions is felt, particularly by housewives, e.g. deep freezers cannot be opened when the power is off, hi-fi's cannot always be played, washing is more laborious etc. Consumption per household varies tremendously according to habit, age, numbers etc; it ranges from 100 to 1,000 kilowatt hours/year for married people.

Electricity is charged to the Camp user at a rate fixed by the management. This varies from 5 p a unit on FIC farms to 16-17 p on some settlements, with the average being about 10-12 p/unit. Many farms, including FIC, do not attempt to estimate exactly what rate they should charge on a commercial basis i.e. by adding up operating costs and depreciation and dividing by the total number of units estimated to be required by farm and domestic needs.

For a typical medium sized settlement with about 10 houses with bunkhouse etc, using 2 x 6 kw generators, taking interest on capital at 12 per cent over 15 years and with an annual running time of 2,400 hours, it is estimated that at current fuel costs (41p/gallon), electricity would need to be charged at about 12-13 p/unit to domestic households to recover their share of running and depreciation costs. If the generators were left on all day, running time would double for a total power consumption increase estimated at only 15 per cent. There would be concurrent increases in maintenance and depreciation costs (but only about a 10 per cent increase in average fuel consumption per unit generated), so that the price of electricity would have to be raised for a similar sized settlement to about

14-16 p/unit. It is a matter of debate, which so far as is known has not been held, whether consumers would tolerate this order of increase in the price of electricity for the extra convenience of permanent power availability.

Scope for wind power. In the mid-1950s, a study was undertaken by a Mr J.H. Walker of Gilbert, Gilkes and Gordon Ltd to look into the scope for wind power generation in the Falkland Islands, and particularly into the potential for a large scale scheme on Sapper Hill to supply Stanley. Though the final report has not been traced, from an interim report certain facts and tentative conclusions emerged:

i. from readings of anemometers (wind recorders) strategically placed on Sapper Hill, average wind speed was estimated at 16.8 mph, with the lowest month of the year being April at 15.7 mph;

ii. strategic anemometers placings at Port Howard, Fox Bay East and Pebble Island recorded average wind speeds within 0.5 mph of this figure; for Darwin and North Arm the figure was in the range of 13-14 mph;

iii. a recommendation was made for a 70 or a 200 kilowatt wind generator to be installed on Sapper Hill. Annual fuel savings were estimated to be £1,850 and £9,700 respectively, based on 21 p/gallon fuel costs, which at the time would have given a pay-out over 10-15 years.

This and other recommendations for further study were not taken up.

The purpose of the following analysis is to establish the relative economics of diesel engined and wind power generation for relatively small scale projects in Camp settlements. In this situation a wind generator can be assessed:

a. as an addition to diesel generating capacity, whose justification would be as a fuel saver;

b. as an alternative to a new diesel generator, with the old diesel generator as stand-by;

c. as a diesel fuel saver when linked to a battery system.

Medium-sized wind generators vary in output capacity from approximately 2 to 10 kilowatts. Traditionally these have been horizontal propeller type machines which have tail guides, output governors and are mounted on steel towers. Power output is highly dependent upon average wind speed - it is in fact roughly proportional to the cube of wind speed - and so positioning of wind generators is extremely important so as to take in maximum advantage of hill height and shape. Accelerated wind speeds from updrafts (often a factor of 1.2 or more) are experienced on suitably shaped hills.

Much publicity has attended the development of the vertical wind turbines (Darrius and Savonius rotors), though currently only one firm, the Canadian company DAF, is marketing such a unit[1]. The advantages of the vertical rotor are its all-round orientation to any wind direction and its somewhat greater mechanical stability - the 6 kw machine stands 12 metres (with tower) and has a diameter of just over 6 metres. Its disadvantages are that it tends to have lower power conversion efficiency, compared with the horizontal axis rotor, and it is not self starting. However, in tests on the 6 kw Electro propeller and the DAF generators, the Electrical Research Association found the power outputs per <u>average</u> wind speed were quite similar. Quoted outputs at constant wind-speed differ considerably.

a. <u>Wind turbines as diesel fuel saver</u>. The approximate capital cost of an Elektro 6 kw propellor turbine, is £3,000 plus £200 freight/ handling charge. A more recent model, the 7½ kw machine produced by Wesco, is being sold for £2,150, not including installation and freight costs.

Based on the assumption that it would be available for day time use, it is estimated that the diesel fuel price would have to exceed <u>37p /gallon</u> before it could be justified. (See Appendix 3 for calculation.)

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1 Another 0.5 kw vertical axis wind generator unit with twin rotors is currently being developed. The design is aimed at increasing the conversion efficiency through maximising the interactive aerodynamic effect of the two helical rotors. It has not yet reached the experimental testing stage.

For a DAF vertical axis rotor, the break-even fuel price would be 53p/gallon.

b. Wind turbines as an alternative to a diesel generator. Taking the delivered cost of a 6 kw diesel generator to be £870, the breakeven diesel fuel price, above which the purchases of a 6 kw horizontal axis wind generator can be justified, is 35 p/gallon. (See Appendix 3).

c. Wind turbine linked to a battery bank, as a diesel fuel saver. Due to the much greater utilisation of power generated by the wind turbine when the 'lost' kilowatt hours are stored in a battery bank, the breakeven diesel fuel price falls to 18 p/gallon. (See Appendix 3.)

Purchase of a battery system, costing some £700, sufficient to store the lost kilowatt hours in a situation where there was already standby diesel generating capacity, plus an £800 AC inverter would add another 7 p/gallon to the breakeven cost of diesel fuel.

The analysis shows that, although it is probably unlikely that the purchase of a wind turbine can be justified in the first two cases examined, the additional capital cost of a wind generator plus loan interest shows a substantial return (over 30 per cent DCF return) when connected to battery storage, taking the current diesel price of 41 p/gallon. This is still the case after the additional cost of a battery system plus an AC inverter has been added. (See Appendix 3.)

At lower average wind speeds of 13-14 mph, the breakeven cost of diesel, at which a 7½ kw wind generator plus battery storage system is economically justified, would rise to about 24 p/gallon.

Though the analysis was performed for a relatively small and therefore less efficient 6 kilowatt diesel generator, the extra output per capital cost of larger engines is matched by an improvement for the larger 10 kilowatt wind generator.

Electric fences. Wind generators have a potential use as unattended chargers for electric fences. Electric fencing has the economic attraction of being virtually half the cost of conventional fencing - now some £850/mile. This saving is achieved by reducing the number or wires and strength of the stakes and installing an electric pulse energiser in tandem with a small power unit. This unit could maintain an adequate charger for 300 miles of fencing. A wind generator is essentially competing in cost terms with two 12 volt batteries in series. With the battery system, it would be necessary to have at least three spares, giving a total initial capital outlay on batteries of £100, on top of which the annual changing (every 6 weeks) and recharging costs would amount to about £60 on current labour and fuel costs.

Discounting future annual costs at 12 per cent, taken to be the commercial cost of borrowing:

Breakeven capital cost of wind generator = approx £1,000.

The smallest machine that could be used in these circumstances is a 200 watt wind charger marketed in the UK by Conservation Tools and Technology costing £270 plus freight. Such a machine would be well suited and would show a pay-out in less than 4 years, and yield a DCF return of nearly 40 per cent.

Scope for hydro-electric and tidal power. Annual rainfall in the Falkland Islands is generally low compared with the UK varying from around 15 inches in the flat areas of West Falkland up to 27 inches in Port Stanley. The low run off and high evaporation rate generally make for unfavourable conditions for hydro-electric schemes. However in the 1950s some feasibility studies on potential sites for small hydro-electric schemes were carried out. The Walker report, already referred to, recommended flow measurements should be carried out at Port Howard, Hill Cove, Roy Cove, Chartres, Port Stephens and Camilla Creek (for the Darwin/Goosegreen Settlement). To what extent these recommendations were followed through and reported is not known, though at Port Howard, which is favoured by a relatively fast running stream, the flow was found to be very variable. This situation can only be corrected by high cost damming constructions which would be ruled out on economic grounds. The greatest hydro-electric potential probably

lies in the head waters of the San Carlos river and might be considered worth examining if a fisheries development were ever sited at Ajax Bay. This aroused interest in relation to a generating scheme for the earlier freezer project at this location. Tidal power schemes, which could in theory be established at one or two locations in West Falkland, have high capital costs per kilowatt of power capacity compared with alternative small electricity generating units.

WATER SUPPLY

Stanley water supply

The source of the existing water supply for Stanley is the Moody Brook, the abstraction point being an old Trout Hatchery Weir which was built in 1941. The abstracted water is conveyed by pipeline a distance of about 500 feet to a filtration plant with a rated capacity of 6,000 gallons per hour. This plant was installed in 1956 as a result of the recommendations contained in the Pape Report of 1953. The raw water is treated by flocculation and coagulation processes to reduce the peat staining, as well as by chlorination for sterilisation purposes. The treated water is piped to the main service reservoir, built in 1928, which has a capacity of 350,000 gallons and supplies the lower levels of Port Stanley. From this reservoir, water is pumped to a high level tank with a capacity of 150,000 gallons which supplies the higher levels of the town.

Consumption and supply. Table 63 gives the consumption of water in Stanley for each month in the three most recent years. It will be seen from these figures, which include both domestic and industrial consumption and water provided to shipping, that there are considerable fluctuations from month to month.[1] However, on a year to year basis, there appears to be a rising trend in water consumption, in contrast to electricity consumption. It is particularly marked between 1974 and 1975, but the abnormally large consumption figures registered for some months in 1975 (July, October, November, December) were apparently due to a temporary upsurge of demand by Johnston Construction Company in connection with a certain phase of the airport runway construction. The 1975 consumption level is, therefore, unlikely to be sustained.

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1 There may, in fact, be some errors in the monthly breakdown: it is likely for example, that part of the January 1975 consumption has been included in the December 1974 figure.

Table 63. Stanley Water Filtration Plant: Consumption, 1973-75
(gallons)

	1973	1974	1975
January	1,688,893	1,921,326	1,092,490
February	1,702,375	1,259,654	1,694,080
March	2,160,000	1,477,540	1,880,030
April	1,368,000	1,755,980	1,893,420
May	1,700,106	1,684,540	1,823,630
June	1,586,263	1,373,150	1,808,730
July	1,482,890	1,988,820	2,780,020
August	1,289,180	1,625,550	1,871,480
September	1,857,078	1,673,400	1,940,950
October	1,542,000	1,819,530	3,156,610
November	1,398,000	1,667,790	2,354,610
December	1,626,000	2,057,740	3,322,080
Total	19,400,785	20,305,020	25,618,130

Source: Public Works Department, FIG.

Both of the post-war surveys of the Stanley water supply have commented on the relatively high level of water consumption in Stanley. The figures provided to the survey team indicate that, for the three years 1973-75 inclusive, consumption averaged about 60,000 gallons per day or approximately 1.8 million gallons per month. Assuming a Stanley population of 1,000 the daily water consumption in 1975 averaged 70 gallons per head.[1]

The filtration plant is rated at 6,000 gph so that its ultimate capacity operating 24 hours a day every day of the week and allowing a deduction of half an hour per day for filter washing, is 141,000 gallons per day or 4.2 million gallons per month. Thus consumption over the last three years has on average amounted to only 42 per cent of plant capacity. The exceptionally heavy demand by Johnston Construction Company in December 1975 - which produced by far the largest monthly consumption figure to date - absorbed 78 per cent of plant capacity.

The conclusion reached by Mr Casserly in 1972 was that the capacity of the filtration plant is ample for the needs of Stanley's present population and for existing industrial demands. The survey team sees no reason to disagree with this view. However, some possible future industrial developments would require much more water than the present filtration plant could supply. It is understood, for example, that the water requirements

1 Without making any adjustment for water taken by ships.

of the proposed alginates plant would far exceed the capability of the filtration plant, and that Alginates Ltd would plan to pipe a supply of water from the Murrell River (which is a much larger source than Moody Brook) for this purpose.

In the last resort, of course, the adequacy of the Stanley water supply depends on the flow of water in the Moody Brook. During the most recent very dry spell, in November 1970, a serious drought occurred which made it difficult to maintain supplies of water to the public. An appeal was made over the radio to conserve water and demand was almost immediately reduced by a third. Since the Casserly Report steps have been taken to augment the flow in the Moody Brook and a wing wall has been extended on one side of the Trout Hatchery Weir to increase the catchment area.

Organisation. The Casserly Report made a number of detailed recommendations designed to ensure that the filtration plant was operated according to recognised good practice. It has not yet been possible to implement all of these recommendations mainly because the organisational recommendations made in the Report have not been carried out. The basic problem is that the Senior Filtration Plant Operator, because of his plant shift duties, does not have sufficient time to carry out tests and trials, to ensure that proper records are kept, to train staff or to generally supervise plant operations. Short of appointing an Inspector of Waterworks as Casserly recommended, it may still be possible to obtain most of the benefits of the Casserly organisational recommendations by combining the water supply and plumbing activities of PWD under the present Senior Plant Operator (who could be redesignated Supervisor of Water Works and Plumbing). This would provide more staff flexibility and would involve, at worst, the employment of only one more plant operator.

Finance. The costs of the Stanley Water Supply, as computed for the purpose of rating assessment in 1975/76, were as follows:

	£
Staff salaries	3,072
Cost of living allowances	1,752
Old age pension contributions	125
Pension contributions, gratuities, etc	1,037
Passages	35
Other charges (Electricity, chemicals, repairs, etc)	8,570*
Total	14,591

* Average of 2 years 1974/76.

Source: FIG.

While all the direct costs, as listed above, are recouped as a part of Stanley rates, no account is taken of depreciation of plant and equipment or of that proportion of indirect overhead expenses such as the administrative costs of rate collection attributable to the water supply operations.

Capital expenditure. There is evidence that much of the water supply plant and equipment has been allowed to deteriorate over the years. The filtration plant itself is currently in a run-down condition and requires general repairing and repainting. Some of the equipment is beyond repair and requires replacement at an early date. In particular, the sedimentation, wash water and coagulation tanks all need to be replaced. The cost is likely to be of the order of £10,000 delivered to Stanley. A provision of £5,000 has already been made in the 1975/76 estimates in respect of the sedimentation tank.

Another item of capital expenditure, recommended by Casserly, which should not be delayed, is the fencing of the low level reservoir area. There is obviously a pollution risk, and also a safety risk to children. A suitable human and animal-proof fence surrounding the area is likely to cost about £1,000.

Camp water supply

Water is required in camp not only for domestic purposes but also sometimes for farm activities such as sheep dipping. The main sources of water are the natural springs which are readily available in most locations. Whether or not the spring is underground, the water is usually pumped by windpower to a storage tank or reservoir whence it is gravity-fed (or electrically pumped) to the settlement. Some settlements obtain their water by damming streams and abstracting the impounded water.

Very few settlements have water supply problems. In general, the most westerly parts of the islands, which have the least rainfall, are the most susceptible to occasional water shortages in exceptionally dry conditions, but in each of these locations there are new sources of supply which could, if necessary, be tapped. Any substantial increase in population in Goose Green would require the development of a new water supply source. Such a source is available at Camilla Creek which is about four miles from the settlement.

Camp water is untreated but the quality is generally considered to be good, although it is often peaty and deeply coloured.

The recurrent costs of camp water supply seem negligible and the capital costs have invariably been written off over the years.

CHAPTER 14 - SOCIAL INFRASTRUCTURE

MEDICAL SERVICES

The Medical Department

The Islands' medical services are provided by the government-run Medical Department. The Medical Department operates from the King Edward VII Memorial Hospital in Stanley, which contains 27 beds in 14 wards for medical, surgical, obstetric and geriatric cases and limited office and consulting room accommodation.

The staff of the Department comprise:

- 3 medical practitioners (including 1 senior medical officer);
- 1 dental surgeon;
- 4 nursing sisters (SRN), including 1 matron;
- 6 nursing assistants unqualified;
- 1 laboratory/x-ray technician;
- 1½ clerical staff;
- 4 domestic staff.

All the medical officers, the dental surgeon, matron and most of the nursing sisters are expatriates recruited under OSAS terms.

A distinctive feature of the Islands' medical service is its inaccessibility to the 31 farm settlements which can only be reached by aircraft. This adds to the cost of medical attention and calls for a higher staff/patient ratio than in a less dispersed community.

Comparative staff to patient ratios are set out in Table 64 below:

Table 64. Comparative Staff/Patient Ratios Falkland Islands and Orkney Islands

	Falkland Islands	Orkney Islands
Total population	1,900	17,675
Population per:		
Doctor	633	982
Dentist	1,900	4,419
Nurse (all grades)	190	116
Technician	1,900	17,675*

* Most laboratory work is done in Aberdeen.

Sources: World Health Organisation, Team estimates.

Assessment of the adequacy of the present staffing levels is inhibited by the absence of statistics on morbidity even for hospital inpatients. Taking account of the practice of referring serious or specialist cases to hospitals in Argentina, the relatively low ratios suggest that overall the staffing is adequate for the provision of a non-specialist service of high standards. An exception is the number of trained nurses, particularly as there is no qualified pharmacist and no nurse fulfilling the role of a district nurse or health visitor.

Costs. In 1974/75 FIG expenditure on the Islands' medical service was £92,000 which represents a cost per head of the population of £48. However, there is no regular provision for capital expenditure on replacements, renewals, or new items of equipment and therefore the annual budget expenditure tends to understate the true cost. At present many essential items are in need of replacement, particularly in the hospital. Taking these factors into account, including transporting patients from the camp by Beaver and also of medical treatment overseas (29 per cent of total costs), the cost per head of medical services was probably much the same as in the Orkney Islands at £62 but probably lower than in the Scottish Highland Region at £86.

Revenue. The Islands' medical services are not all free. There is a complex system of charging for hospital admissions, x-rays, operations, visits by a medical officer to a patient's house, medical treatment overseas and drugs. Except in the case of drugs[1], for which the actual

1 The charge for drugs may account for the low expenditure on this item (4 per cent in 1974) compared with about twice this proportion of health expenditure in UK. The doctors acknowledge that prescribing is related to patient's ability to pay; generic drugs predominate.

landed cost is charged, all items are heavily subsidised and total revenue only accounts for 12-15 per cent of total spending. Apart from the administrative burden of producing numerous bills and collecting the charges -a burden which also reduces professional efficiency - the system of charging, although logical, together with the camp medical subscription (a form of insurance scheme) results in anomalies. The Senior Medical Officer has pointed out that in particular a heavy burden is placed on those who can least afford medical treatment, the old and the chronically sick.

Medical services in Stanley

In Stanley the medical service comprises inpatient treatment, referral to hospitals in Argentina, outpatients' clinics, and visits to patients in their homes. Details of the number of patients treated in the first three of these categories is given in Table 65 below.

Table 65. Medical Treatment in Stanley, 1972-75

Year	In patient treatment	Outpatient visits	Referred to Argentina
1972	211	2,555	52
1973	301	2,962	56
1974	359	3,049	69
1975	357	3,591	45

Source: FIG.

There has clearly been a marked increase in both inpatient treatment and outpatients visits since 1972, attributable to both a more liberal policy on admissions and probably a greater use of the medical services for treatment of ill health.

Medical officers also have public health and port health duties, although the officers state that there is insufficient time to attend adequately to the former.

Medical services for the camp

Even more so than in Stanley, the orientation of medical services is towards cure of ill health rather than its prevention. In addition to the services in Stanley, there are stocks of most-used drugs and dressings at each settlement; the daily 'doctors hour' on the R.T. which links settlements with the duty doctor in Stanley; correspondence between patient and doctor; emergency flights by doctors to treat accident cases or bring in seriously sick patients; and periodic routine medical visits to settlements.

The main limitations of this service are:

1. R.T. consultations are not private and require the patient to visit the manager's house either to phone the doctor directly or get the manager or his wife to do so on his (or her) behalf.

2. The R.T. does not at present operate after daylight hours. (But this should be rectified by the new system - see Chapter 10.)

3. The rota for consultations is such that patients commonly have to consult more than one doctor.

4. Doctors' routine visits to Camp settlements are widely regarded as being too infrequent. This is partly due to shortage of aircraft capacity.

5. Normally there is no night aircraft service for emergencies, although there have been exceptions.

6. Camp medical kits are regarded by doctors and managers as inadequate and in need of standardisation.

7. People from the Camp receiving attention in Stanley may have to wait, at considerable cost in accommodation, for completion of outpatient treatment, e.g. for removal of stitches for minor surgery. If a child is involved, parents may have to lodge in the town for some time, perhaps bringing other children. Many patients stay with relatives, but this is not always possible and acute accommodation problems can result.

One possibility for improving medical services in the Camp would be the appointment of a health visitor/district nurse who could visit the larger settlements more frequently than a doctor and carry out minor treatment and give health and medical advice, particularly to mothers and children. The annual cost to FIG would be of the order of £3,000-£4,000.

Conclusion

From our brief survey of medical services and extensive interviews throughout the Islands, we conclude that the government medical service is adequately staffed, of reasonably high standard and of moderate cost on a per caput basis. There is, however, scope for improvement particularly in relation to facilities available to the Camp population, the irregular and erratic spending on replacement and repairs, and the present system of charging which results in inequities and time-consuming administrative work within the Medical Department.

It was put to us by West Falklanders that a resident doctor should be reinstated at Fox Bay East. Whilst this would obviously benefit the local community, it would not significantly improve accessibility to other West Falkland settlements.

HOUSING

Housing ownership

As with most aspects of the economic life of the Falkland Islands, there is a sharp distinction between Stanley and the Camp. In Stanley, most houses are owner-occupied on freehold land. Of the 310 houses in 1975, 60 were government owned, mainly occupied by government officers (expatriates 24 and local 17). There is no local authority housing, but a number of the poorer quality government houses[1] are rented to needy inhabitants. In 1975, there were 15 such houses, the average rent for which was £11 per month.

In the camp, by contrast, all houses, and the land, are owned by the farm company and allocated, rent-free, to employees. On retirement, employees normally have to leave their houses, in which they may have lived for many decades, and move to Stanley. However, there are a few exceptional instances of old employees being allowed to stay on after retirement, usually in return for light work.

Housing standards

Quantitative data on housing, presented in Table 66 below, suggest that housing standards are generally reasonable.

1 Many are squalid and regarded as unfit for Government officers.

Table 66. Standards of Housing Accommodation in the Falkland Islands, 1972

	Stanley	E. Falklands	W. Falklands
Total number occupied dwellings	337	141	109
Average number persons per room	0.48	0.35	0.37
Dwellings without piped water	3	4	1
Dwellings without water closet	3	8	1
Dwellings without fixed baths	17	3	1

Source: FIG 1972 census.

In some respects, however, the above table is misleading. Firstly, many of the houses are small. Thus in Stanley, almost half have only five or six rooms with an average occupancy of .55 persons per room. Secondly, many of the houses are old and suffer from inconvenient layout or have other adverse characteristics. Forty per cent of all houses in Stanley are more than 55 years old and only 16 per cent have been built since 1940. In the Camp, some bunk houses (occupied by single men), are poor in terms of structure, furnishings, decoration and private space.

As a general rule, houses have gardens which are normally intensively used for growing vegetables. In Stanley, the standard sized plot is ¼ acre, although some are ½ and 1 acre in size, and the garden is adjacent to the house. In the Camp, the garden is frequently at a short distance from the house on the most favourable land.

House construction

Although stone is readily available in Stanley and at many settlements, most houses are of wood frame construction. This is partly due to there having been a tradition of woodworking on the Islands and very few masons. However, local builders claim that this type of construction, whether framed locally from sawn timber or erected from prefabricated units, is best suited to climatic conditions and is cheaper than prefabricated metal or concrete block structures, the two most obvious alternatives.

On Camp settlements, houses are usually constructed by farm labour. In Stanley, the practice is custom building by a building contractor or owner building with the help of jobbing craftsmen and labourers. There has been no speculative building, at least in recent years.

Housing supply

In the Camp there is an excess of supply over demand as most farms are now operating with smaller labour forces. Although there have been several additions to Camp housing over the last few years, very little new building is now taking place.

In Stanley, there is no estate agent or solicitor and consequently no readily available means of assessing what housing market exists. Government operates a housing loan scheme on generous terms. Loans are available for 25 years at 7½ per cent for up to 100 per cent of the value of the property, based on a valuation by the Superintendent of Works. Currently, there are no outstanding applications for loans and this might lead to the conclusion that supply balances demand. However, the sum annually available for housing loans is only £15,000[1], having been increased this financial year from £5,000. Moreover, the practice is to apply for a loan only when a suitable house, with an owner willing to sell, has been identified. Thus, in the absence of any programme of new house building, applications are an indication of pending vacancies and not of demand. Absence of housing for young couples in Stanley is said to be one reason for out-migration. Following extensive interviews by the team, relatively few cases were identified of married couples living with one or more parent (usually with one) and therefore, currently the hidden demand for housing appears to be small.

The current stock of Government housing available for occupation may increase by upto 10 over the next year, depending on the number vacated by expatriate staff. However, with any future increase in the numbers of government staff (see Chapter 20), it will almost certainly be necessary to build additional Government houses.

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1 This might be sufficient for only three loans. Small to medium-sized houses are reported to sell for £5,000-7,000.

Land for building is readily available in Stanley. Within the existing built up area, there are some 15 quarter-acre plots. To the east, where road, water and electricity services already exist, and to the west, where there is a road only, there is sufficient land in private or government ownership to double the present size of Stanley.

Conclusions

In Stanley most houses are owner-occupied on freehold land but in Camp all houses are company owned and employees have to leave them on retirement. With some exceptions, mainly in Stanley, housing standards are generally reasonable although most houses are old. In the Camp, living conditions in some bunk houses are poor and in need of much improvement. Housing supply exceeds demand on most Camp settlements. In Stanley it appears to be temporarily in balance but this balance would be upset should fewer young people wish to leave than in the past or if economic development were to begin.

EDUCATION

Introduction

Education in the Falkland Islands was the subject of a study by Mr. C. R. V. Bell, OBE in 1973. Mr Bell's Report effectively described existing conditions, examined current problems and made recommendations. In this Report, coverage of education is restricted to a brief summary of the services available with comments on conditions and a consideration of the as yet unmet educational requirements to support social and economic development.

School-age population

There are 314 children aged approximately 5 to 15 educated in the Islands, and a further 39 aged 12 to 17 who are educated abroad.

Table 67 below shows the distribution by age and school location of children receiving education in the Falklands during 1975. Approximately a half of these received their education in Stanley.

Table 67. Falkland Islands School Population, 1975 and 1970

Location of education	1975*				1970
	5 - 8	9 - 11	12 - 15	Total	Total
Stanley	63	49	37	149	204
Darwin School	17	25	19	61	49
Camp settlements	57	23	24	104	130
Total	137	97	80	314	383

* In addition 39 children were receiving education overseas in 1975.

Source: FIG

The following education facilities are provided on the Islands.

Camp education

Darwin School. The school, built by the Falkland Islands Company, provides day schooling from age 4/5 to 15 for local children and education on a

boarding basis for camp children from the age of 8½ to 15. In 1975, there were 61 pupils of whom 39 were boarders and 22 day children. Primary education is provided up to the age of 11, and secondary education continues up to 17 but below 'O' level standard.

Camp settlements: full-time schools. Seven settlements have full-time schools. These provide education mainly, but not exclusively, for children aged 5 to 12. Four of these schools have full-time teachers employed by the government, and three are staffed by part-time teachers who are otherwise employed as book-keepers on the farms. As with the primary school at Darwin, the emphasis is on general education.

Itinerant teaching. Eight itinerant teachers provide the schooling on the other 24 settlements. The teaching takes place in small classrooms provided at farm settlements or in the case of outside shepherds' children, in the pupils' homes. Age ranges of children are similar to those in full-time settlement schools. Pupils receive teaching for only two weeks out of every 6 to 8, and are expected to do homework under parental supervision - which varies considerably - in the intervening period.

Stanley Schools

The junior and senior schools provided day schooling for 112 and 37 children respectively in 1975. The former has six classes for children aged 5 to 11, and the latter contains four classes for those aged 12-15. Between them, the two schools have 14 teachers. At the primary school level, general education is provided with emphasis on the three 'R's. The senior school provides mainly sub 'O' level standard secondary education although a few pupils have taken 'O' levels in English and RSA commercial subjects.

Overseas education

Education overseas is provided for 39 children (end 1975) in the age range 12 to 17, at schools in Argentina (25) UK (7) and Uruguay (7). Each year the Falkland Islands Government offers two 11+ scholarships for schools

overseas. These cover the total costs of the child's education. There are ten such scholarships. The Argentina Government has offered an unlimited number of scholarships, of which 22 have been taken up. The other seven children have been sent at their parents' initiative, assisted financially by an FIG overseas education allowance. In most cases the pupils are pursuing an 'O' level, or equivalent course.

Education finance

FIG contribution. Education on the Islands is largely a free service provided by FIG's Education Department. In 1973/1974 the cost to Government of education services was £78,000 which represents 13 per cent of total Falkland's Island Government expenditure, about 3.4 per cent of GDP and £221 per child of school age. In all respects, this is lower than the case of UK. The expenditure per child is about one third of the figure for the Shetland Islands. The small number of children at Darwin school makes it an expensive means of educating camp children. The cost per boarding pupil in 1975 was approximately £700, compared with £200 per day pupil at Stanley.

FIG pays the full cost of education for overseas pupils on FIG scholarships and also an overseas education allowance for children unable to secure a scholarship. This allowance covers only part of the costs (generally less than 40 per cent, but varying with the travel distance and school fees). This expenditure on secondary education overseas has accounted for 15-16 per cent of total education spending over the last three financial years.

Parents'contribution. Parents pay for the following:

i. the boarding fees for pupils at Darwin;
ii. that part of the cost of overseas education not covered by allowances;
iii. normally the full cost of higher education - the Falkland Islands Company meets these costs for some of its employees.

The Argentine government scholarships cover the full cost of education.

Comments

It would be inappropriate for the team to form any firm conclusions on the future educational needs and developments of the Falklands after barely four weeks in the Islands. The following is therefore intended to be by way of comment on previous reports and remarks made to the Team by the Education Officer and other local groups.

Darwin School. The team saw no reason to differ from Mr. Bell's overall conclusions on the inadequacies and unsatisfactory aspects of Darwin school, and supports his recommendation for its closure except in respect of primary education for the local community.

Itinerant teaching in Camp The life of an itinerant teacher is tough and demanding. All of the teachers are uncertificated and 3 are young VSO recruits on short assignments. They have limited teaching time and inadequate facilities and materials. Not surprisingly the quality of education provided is varied and generally of low standard. Following Mr. Bell's recommendation, a programme of taped cassette lessons is being prepared by an expert under British Technical Assistance, which should improve camp education. Camp teachers also suffer from lack of professional contact with each other and with more experienced members of the teaching profession. Given the demanding nature of the work it is considered that, in general, VSO teachers are unlikely to possess the required maturity and educational attainment.

Stanley schools. Mr Bell's report on the facilities and achievements at the junior school was generally favourable, although it should be noted the staff-pupil ratio is high by British standards. He had more reservations on the senior school, particularly with regard to the syllabus - lack of local content and relevance in subjects such as history and geography - the absence of adequate craft workshops, no provision for CSE examinations, and resistance to innovation. So far few of Mr Bell's recommendations have

been implemented due to a combination of lack of funds, delay in coming to policy decisions and administrative congestion within the Education Department.

Overseas education. Provision ensures that some children have a satisfactory secondary education which is likely to lead on to higher education or professional training. However, as Mr Bell pointed out, there can be no educational or financial justification for continuing with overseas scholarships up to 'O' level age, once a new secondary school is built in Stanley. Overseas scholarships remain, however, the only means of ensuring that children capable of proceeding to 'A' levels do so.

The achievement of a satisfactory level of secondary education in the Falklands is of great importance to the future development of the Islands. This applies not only in so far as it affects immigration of families to the Islands, but particularly because of the need to raise the skills and abilities of young Islanders to meet the challenges and opportunities of the future. In spite of the apprehensions of many camp dwellers on the question of sending their children to Stanley for secondary education, if Darwin school is closed (based partly on the concern that they might not return to the Camp, but also out of worry over their general welfare in Stanley), the centralising of education facilities by building a new school and boarding house in Stanley would appear the most effective means of achieving the necessary improvement. The alternative of enlarging and improving the Darwin school would suffer in comparison because of:

i. higher overall cost;
ii. spreading of educational resources;
iii. inability to attract and retain such good teachers.

Curriculum changes to raise the level of awareness of pupils of their social and physical environment, and of the Islands' history and traditions would stimulate and validate their sense of local identity.

Other areas of education. The Government makes no provision to provide or assist with either higher education or recreational training. The Education Department has no regular adult education programme although it

does endeavour to provide courses if there is a specific request. Yet the need for provision under these heads is no less than in any other community; indeed in view of the restrictions imposed by the island situation it is arguable that the case for such provision is unusually strong.

There is also considerable scope for improving the level of vocational training at secondary level for both boys and girls. From an agricultural view point, Darwin school could continue to play a role in this respect.

Policy-making and administration

Theoretically the six-man Education Committee of the Legislation Council is the policy-making body. In practice, since its establishment in the early 1970s, the Committee has met too infrequently to become effective and the Superintendent of Education, with other senior government officials, has filled the vacuum. The addition of co-opted members (including teachers) to the Education Committee, as recommended by Mr Bell, has not yet taken place.

The Superintendent of Education undertakes both administrative and professional supervisory duties. He is supported by only one clerk in a Department, which in addition to schools, also runs the Stanley Library, and is clearly overburdened with administrative chores. The extra clerk recommended by the Bell Report to deal with accounts and budget preparation has not yet been appointed.

SOCIAL SECURITY

The social security system on the Islands is both narrow in range and limited in scale. Benefits have tended to lag behind price rises. It comprises:

1. Old age pensions. This contributory scheme was introduced in 1952. Following a recent sharp increase in benefits, members of the scheme over the pensionable age of 65 are now entitled to receive £8 a week for a married couple or £6 a single person. The contributions amount to 80 p per week from the employer and 50 p per week from the employee.

2. Non-contributory pension. This covers the limited number of very old people excluded from the OAP. Benefits are only £5 a week for a married couple and £4 for a single person.

3. Family allowances. Allowances are payable at the rate of £1 a month for the first two children and £1 per child for each additional child.

4. Charitable relief. There is a budget provision of £2,000 a year available for cases of financial hardship. The individual has to claim.

In 1973/74 spending on social security amounted to £8,751, 1.5 per cent of total government recurrent spending. This increased sharply to £29,500 in 1974/75, 3.25 per cent of government recurrent spending, almost entirely on account of increased expenditure on pensions. This increase mainly took the form of a subsidy to the contributory scheme to make possible payment of higher pensions, albeit at the relatively low current levels.

RECREATIONAL FACILITIES AND ACTIVITIES

In the Camp virtually all settlements with more than half a dozen houses have a hall of sorts for recreational purposes, ranging from Nissen huts to well equipped and more appropriate buildings, though the latter are in the minority. The best naturally tend to be in the larger settlements, and in three or four cases are complemented by well-run social clubs offering a wide range of indoor activities and a lounge bar. Certain settlements, where there are appropriate facilities, take it in turn to hold an annual sports and race meeting which attracts people from other communities, usually involving long slow journeys by Land Rover, and are marked by the popular "two-nighters", i.e. dances taking place over two successive evenings. However, the smaller settlements in West Falkland currently are experiencing difficulties in meeting the costs of this event.

In several settlements where numbers are marginal - say 25-40 people - a hall usually exists, but not surprisingly it is rarely of a high standard and activities tend to be limited to films, occasional dances and whist drives. In the smaller settlements the only organised recreation is usually the showing of films which are sent out to all settlements from Stanley. Unfortunately, the projectors and the films themselves are commonly in poor condition.

Dissatisfaction was expressed to the Team in regard to recreation by not a few people in the settlements, including some of the larger communities. This was usually in respect of organised facilities and activities, for which there is no system of public financial aid as is customary in the UK. Indeed, the fee required for a bar licence (£100) is cited as being in effect an official disincentive to the improvement of facilities in small communities.

At the informal level, of course, there is a good deal of activity, e.g. visiting from house to house, though rather less perhaps than goes on in comparable situations elsewhere. Many people find their recreation out of doors, in shooting, fishing, and riding, for instance. Others have hobbies and interests which they pursue at home, including amateur radio, which is

operated with impressive efficiency and provides much needed external contact. Though many men and women are competent in a variety of skills, from motor mechanics (it is quite usual for men to own a vehicle of some sort) to knitting and needlework, the traditional crafts such as horse-gear making and hornwork are now very rare.

For some with leisure interests, then, life in the Camp can be busy and varied. Yet the team heard a good deal of concern expressed about the lack of stimulus. Not a few Camp dwellers, though intelligent, lack the basic educational skills to be able to take full advantage of some of the activities, involving books and study for instance, which can help to make life in remote rural situations agreeable, and even rather privileged. In particular, many women said they felt their horizons to be distinctly restricted and often longed for a change of scene, however brief, and for more links with the world beyond than the limited broadcasting service from Stanley (or their husbands' amateur radio operations) could provide. It has to be remembered that there are no newspapers to help in providing such contact. The fact that for practical purposes there are no roads - for instance to permit an individual or a family to spend an evening in another place - also has much to do with the problem. It seems likely that the lack of stimulus in the Camp is responsible in no small part for the high level of outmigration, particularly of women. It probably also has a good deal to do with the very high level of divorce.

Several women asked us whether a television service would be feasible. The attraction seemed to be the availability of new scenes and ideas, which TV affords in the home at the touch of a switch. In fact, television in the Falkland Islands is not altogether out of the question, in view of recent technological developments. Video-cassette equipment has been falling quite rapidly in price, and appears to be nearing the reach of many Falkland Island families - and certainly of whole communities. Experience elsewhere suggests that, if feasible, it would not necessarily damage community life. It might even be possible to make some local programmes with the lower-cost portable equipment now available, thus helping to engage people more closely in local affairs.

One aspect of Camp life which gave several of the team's informants cause for concern is the standard of living of single people accommodated in the bunkhouses or cookhouses. In some cases conditions are of quite a high order, but in others this is not the case. Although all the bunkhouses we visited had single rooms, they were often cramped with minimal furnishing and decoration, and inadequate soundproofing. Provision for communal eating and recreation is distinctly basic in some cases. The high level of drinking in certain bunkhouses at weekends, in spite of the rationing of alcohol by the management, is not altogether surprising, and is another argument for extending recreation and stimulus.

The situation in Stanley as regards formal recreation is at first sight quite impressive. Various sports clubs exist (football, badminton, squash, cricket, golf, darts, sub-aqua, rifle shooting etc), and there is an annual race meeting and gymkhana attended from throughout the Islands. There are several general social clubs, and for women the Red Cross and Corona Societies are active in the town. All in all, it is said that there are almost thirty recreational associations in Stanley. However, by no means all of these are flourishing, some are virtually defunct, and in many cases the initiative in founding and maintaining them has had to come from the same body of active people, including a significant body of expatriates from the UK.

Physical facilities for recreation would probably be thought adequate for a community of about 1,000 in Britain, and there are church halls, some clubs with their own premises, and a spacious Town Hall, complete with stage, available for public functions such as dances and films. The Town Hall also houses the library. However, rather more than this seems needed, given the isolation of Stanley and the islands as a whole, and the fact that there are usually a number of visitors who also have recreational needs. Funds are currently being raised by the community for provision of a swimming pool. There is no multi-purpose community centre of the kind which is now being provided in some rural areas in the UK. It would go some way to help in this direction in Stanley if library opening hours could be extended, and if reading and writing facilities were provided, all such services being made available in the same building (conceivably the present Town Hall, possibly extended), preferably with the museum as well. A day centre for old people, and a small room to be used for club committee meetings in the evenings, or during the day as a citizens' advice bureau would also be useful.

One group whose recreational needs are not fully met is the youth of Stanley (and indeed of the Falkland Islands). The departure of young people has been recognised as one of the Islands' present problems, and in addition to some of the factors already referred to, such as limited career opportunities and the dependence of Camp life, it is clear that young people feel keenly the lack of recreation. Most of the recreational facilities mentioned above have been created for and are patronised by older people who are relatively established in local society. Such organisations as exist specifically for young people - essentially the Boys' and Girls' Brigades - struggle impressively against lack of members and leaders. They now find it difficult to retain members beyond the age of fourteen, though they once had a large proportion aged fifteen to eighteen. A youth club was relatively successful until the UK expatriate who led it returned to the UK. A new building which was to have been used by the Club has stood half-complete in Stanley for two years. Two yachts presented by the Argentinian Navy to local youth some time ago remain unused.

Young people in Stanley[1] said they particularly want somewhere to meet, drink coffee, play music and possibly dance. Efforts to start a 'disco' type facility of this kind have so far been frustrated by difficulties over obtaining a hall or similar premises in Stanley but there is a possibility that the Working Men's Club will extend its facilities for young people. There certainly seems to be a need for a facility of this sort, if only to take some young people off the streets of Stanley at night. Delinquency - so far of a relatively minor kind - has evidently increased of late; though the young people met by the team seemed to have a responsible outlook.

No doubt youth could do more to help itself, and it may be that this is another aspect of the lack of initiative arising to a great extent from the pattern of dependence in the Islands. However, it is a fact that in the UK (including the islands) and elsewhere, young people need to be helped to help themselves, and every education department nowadays has its staff of youth and community officers trained in such work. Indeed the current approach is to view adult education, youth work, and community development

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1 Based on interviews with team members.

(all of which are lacking but highly necessary in the Falkland Islands) as part of a total pattern of 'community education'. There is at present no-one officially responsible for encouraging any aspect of such activity in the Falkland Islands.

Ordinary (recurrent) revenue and expenditure

The Falkland Islands have traditionally been self-supporting financially, at least in terms of recurrent revenues and expenditures. (Development expenditure is a separate matter which is discussed in a later section of this chapter.) The colony is not grant-aided, but it has managed over the years to balance its budget from its own resources. Table 68 gives the recurrent revenue, expenditure and surplus or deficit of the Falklands in each of the ten financial years (1 July to 30 June) from 1965/66 to 1974/75 inclusive and the estimates for 1975/76.

Table 68. FIG Recurrent Revenue, Expenditure and Surplus/Deficit
(£'000 - current prices)

	Recurrent Revenue	Recurrent Expenditure	Surplus/ (Deficit)
1965/66	410	365	45
1966/67	380	392	(12)
1967/68	474	419	55
1968/69	407	465	(58)
1969/70	395	463	(68)
1970/71	520	498	22
1971/72	533	522	11
1972/73	466	525	(59)
1973/74	717	601	116
1974/75	944	876	68
1975/76 (estimated)	1,183	955	228

Source: FIG.

In the ten years 1965/66 to 1974/75 (inclusive) the cumulative net surplus amounted to only £120,000 and four years showed budget deficits. In the fifteen year period 1960/61 to 1974/75 (inclusive) eight years resulted in budget deficits while only seven yielded surpluses. Fortunately, the surpluses in total more than compensated for the deficits, and the latter were met by drawing on reserves.

It can be seen from Table 69 that recurrent expenditure at current prices has increased unfailingly from year to year, with a minor exception in 1969/70 when it stayed at the preceding year's level. Recurrent revenue,

however, has followed a more erratic pattern, tending to fluctuate as the market price of wool has affected company profits. There is a delay of approximately 18 months before a particular year's business results are reflected in Government tax revenue; thus the fall in the price of wool on the international commodity market in 1965, 1967, 1968 and 1971 resulted in a drop in Government revenue in 1966/67, 1968/69, 1969/70 and 1972/73 respectively. The price of wool is undoubtedly the main determinant of Government revenue and the four budget deficits in the past 10 years have been largely due to poor wool prices. The relationship between recurrent revenue and recurrent expenditure at current prices is illustrated graphically in Fig 8.

While expenditure has shown a marked upward trend measured in current prices, it has not increased similarly in real terms over the past 10 years[1]. Table 69 shows that between 1965/66 and 1968/69 annual recurrent expenditure at constant prices increased by 10 per cent, but between 1968/69 and 1973/74 it fell by about 20 per cent. In 1974/75 there was a sharp increase of 20 per cent in a single year.

Table 69. FIG Recurrent Expenditure at 1974 Constant Prices

	£ thousand
1965/66	748
1966/67	768
1967/68	779
1968/69	823
1969/70	782
1970/71	792
1971/72	778
1972/73	693
1973/74	661
1974/75	793

NB: The Cost of Living Index was used to convert other years' expenditure to 1974 values.

1 Nor, perhaps, should it have in the light of the 5 per cent decline in population in the same period.

The breakdown of Falkland Islands Government ordinary (recurrent) revenue and expenditure, by main headings, for the years 1973/74 to 1975/76 is given in Table 70. The most important single source of Government revenue is "Internal Revenue" which is derived mainly from Companies' Tax and Income Tax[1]. Internal Revenue has always been a major revenue source and in recent years its importance has increased. In 1971/72, this source represented rather less than a quarter of total Government revenue; in 1973/74 it formed one-third; and in 1975/76 it is expected to constitute 53 per cent of the total. Companies' tax alone is expected to contribute 38 per cent of total Government revenue in 1975/76.

Table 70. Falkland Islands
Government Ordinary Revenue & Expenditures 1973/74-1975/76
(£)

Revenue		Actual 1973/74	Revised Estimate 1974/75	Estimate 1975/76
I.	Aviation	29,825	34,000	38,000
II.	Customs	68,803	98.000	117,000
III.	Dependencies' Contribution to cost of Central Administration	4,500	10,000	10,000
IV.	Fees & Fines	16,982	17,905	22,070
V.	Harbour	23,530	30,282	31,150
VI.	Investments	105,185	39,120	41,520
VII.	Internal Revenue	237,754	401,581	627,061
VIII.	Miscellaneous	32,894	46,200	59,716
IX.	Municipal Services	63,115	108,550	114,600
X.	Post & Telecommunications	86,739	105,417	77,240
XI.	Reimbursements	15,514	13,823	7,795
XII.	Reimbursements from HMG*2	22,295	25,000	27,000
XIII.	Rents	9,443	9,570	10,470
	Land Sales	105	105	-
Total Ordinary Revenue		716,684	939,553*	1,183,622

(continued)

1 Companies Tax is charged at 40 per cent on taxable profits. Income tax is charged on a sliding scale commencing at 15 per cent on the first £500 slice of chargeable income and increasing to a top rate of 45 per cent on taxable income in excess of £4,500.

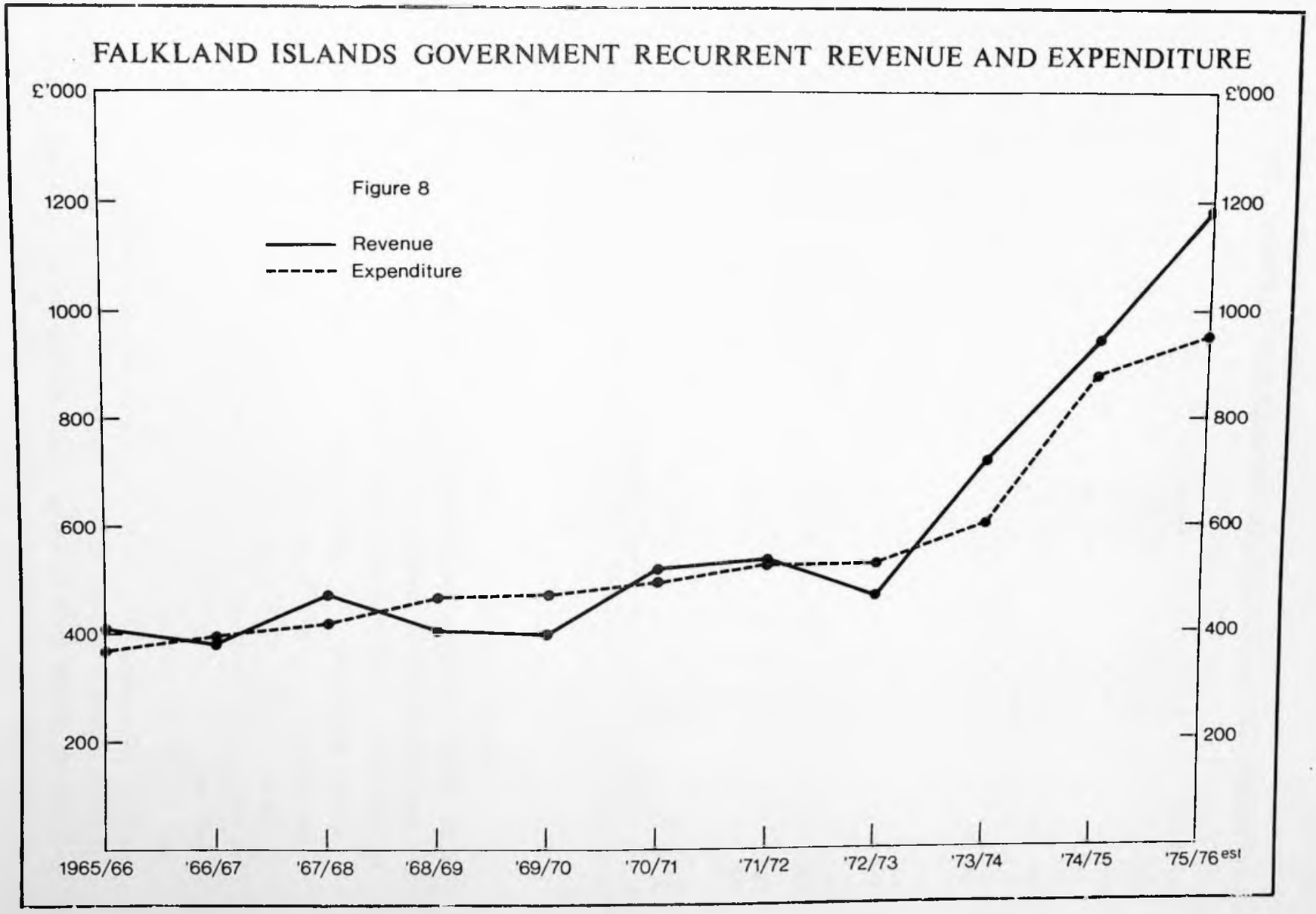
FALKLAND ISLANDS GOVERNMENT RECURRENT REVENUE AND EXPENDITURE
£'000
£'000
Figure 8
Revenue
Expenditure
1200
1000
800
600
400
200
1965/66
'66/67
'67/68
'68/69
'69/70
'70/71
'71/72
'72/73
'73/74
'74/75
'75/76 est

Table 70. Falkland Islands
Government Ordinary Revenue & Expenditure 1973/1974-1975/76 (continued)
(£)

Expenditure	Actual 1973/74	Revised Estimate 1974/75	Estimate 1975/76
I. The Governor	14,288	16,874	19,354
II. Agriculture	2,584	3,369	3,753
III. Aviation	49,113	68,991	74,088
IV. Customs & Harbour	30,029	29,749	39,844
V. Education	78,018	106,200	130,466
VI. Medical	72,212	91,959	112,811
VII. Meteorological	4,479	6,071	8,656
VIII. Military	1,747	2,895	10,382
IX. Miscellaneous	11,667	101,254	18,426
X. Pensions & Gratuities	28,216	51,206	27,900
XI. Police & Prisons	11,345	15,216	17,754
XII. Posts & Telecommunications	63,337	81,724	79,549
XIII. Public Works	72,879	98,562	128,618
XIV. Public Works Recurrent	53,135	63,624	75,803
XV. Public Works Special	4,166	5,949	18,303
XVI. Secretariat, Treasury & Central Store	65,719	87,726	92,827
XVII. Overseas Passages	25,335	42,000	57,000
XVIII. Social Welfare	8,751	29,450	32,000
XIX. Supreme Court & Legal	3,836	5,541	7,642
Total Ordinary Expenditure	600,856	908,360*	955,176

* Subsequently further revised in total - See Table 68. *2 Passage costs for overseas officers.

Source: FIG Estimates.

The increasing importance of Internal Revenue, in relative terms, is attributable in part to the declining importance of Investment Income as a Source of Government revenue. In 1971/72 Investment Income represented a third of total revenue and this income arose largely from the investment of Savings Bank funds by the Government (see Chapter 3). The income really represented the discrepancy between the low rate of interest (then 2½ per cent tax free) paid by the Government to Savings Bank depositors and the much higher rates it was able to earn by investing the funds abroad. A fiscal report prepared by J E Comben and H Waller early in 1973 urged the Government to pay a higher rate of interest to Savings Bank depositors and to reduce its dependence on this source of income. The Comben and Waller recommendation was accepted in principle and the rate of interest increased to 3½ per cent. In 1975/76 (partly also because of stock market conditions) investment income is expected to contribute less than 4 per cent of total Government revenue.

Customs duties are a significant and reliable source of revenue to the Falkland Islands Government. These represent about 10 per cent of total revenue. Apart from sundry fees and licences the only other significant sources of revenue for the Government are the various revenue-earning services which it provides.

The Government has traditionally provided a wide range of services[1] to the community. These include Aviation (internal), Municipal Services (electricity and water supply to Stanley, etc) and Posts and Telecommunications (broadcasting, postal services and the local telephone service). Government income arises from the charges which are made for these services. In most cases the charges do not represent the true economic cost of providing the services and they are almost all in fact, heavily subsidised.

The single most costly service provided by Government is Education (see Chapter 14). This service, which is free within the Falklands[2], is expected to cost £130,466 in 1975/76 - approximately 14 per cent of total Government spending. The next most expensive is the Medical service (also dealt with in Chapter 14) which is expected to cost £112,811 in 1975/76. About 12½ per cent of the total cost of the service is recouped in charges and fees but this still leaves almost £100,000 to be found by the Government.

The Aviation Department (see Chapter 10), which operates the two Beaver aircraft, provides the only passenger transport service between Stanley and the Camp. The Government Estimates for 1975/76 provide for a gross expenditure of £74,088 and a revenue of £38,000 giving a net cost of £36,088. This represents a subsidy element of about 49 per cent according to the Estimates. The true subsidy, however, is considerably greater than this because the Estimates do not include items such as depreciation of fixed assets and indirect overheads.

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1 The range of services may not be as varied in some respects as those provided in some developed countries, but the range is wide by most standards. 2 Apart from Darwin boarding school fees.

The Posts & Telecommunications Department earns a substantial amount of revenue (£79,240 is projected for 1975/76) but its costs also are high (£79,549 in 1975/76) so that, as a whole, the Department makes a slight loss. As in the case of Aviation the real net cost of the Department is greater than the Estimates would indicate. At least one of the P & T's activities - the sale of stamps to philatelists - is very profitable. Philately accounts for a substantial proportion of the revenue (which is expected to amount to £62,000 in 1975/76) derived by the Colony from the sale of stamps. The normal postal activities, on the other hand, are not profitable in themselves. Telecommunications and broadcasting, also, are subsidised services run by the P & T. These are discussed separately in Chapter 10.

The revenue earned from "Municipal Services" is also substantial: in the 1975/76 estimates it is put at £114,600. This is derived mainly from the sale of electrical energy (£97,500 in 1975/76) and Stanley Rates (£15,000 in 1975/76). Electricity supply, which is discussed in Chapter 13, is charged to consumers at a unit rate designed to absorb all the costs related to it (including amortisation of fixed assets), the aim being to break even in each financial year. The Stanley Rates are intended to cover the cost of municipal services in Stanley. These include the water supply, garbage disposal, street lighting, fire brigade and the upkeep of Stanley. Although the rate levied each year is carefully calculated it does not, in fact, reflect the full economic cost of providing the services, for reasons which have already been indicated.

Municipal services are administered by the Public Works Department which is responsible not only for electricity, water supply and the town services already mentioned, but also Government transport (including the repair and maintenance of vehicles), Government building work, painting, plumbing and carpentry, roads, drainage, cemetery, playing fields, public lavatories, funerals and undertaking. A number of these services would, of course, be provided by local authorities in the UK, while some would be provided by private sector enterprises[1].

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1 If more services were provided by the private sector the Government would, of course, be able to sub-contract much of the work that is now done by the PWD.

Since so many activities are grouped under the PWD umbrella it is, perhaps, not surprising that the Department is the subject of some public criticism. It is alleged that some of the PWD services are inadequately performed, the complete lack of road maintenace in Stanley being frequently cited as an example. In the PWD's defence it can be said that the difficulty of obtaining labour has been a real problem; nevertheless, the total absence of any road maintenance effort in recent years would seem to indicate at least some degree of inertia on the part of the PWD. Another criticism levelled at the PWD is that priority is arbitrarily given to certain kinds of work to the detriment of other work requiring the attention of PWD staff. This may indicate a need to review the existing system of determining priorities in order to ensure that the competing claims on some PWD services are treated on a fair and impartial basis.

The cost of Public Works is considerable. In 1975/76 budgeted Public Works expenditure, including 'special' items, amounts to £222,724, which is 23 per cent of total budgeted recurrent Government expenditure. However, more than half the expenditure (£114,600) should be recouped from revenue which, as mentioned earlier in the text, arises mainly from electricity charges and Stanley rates.

The Falklands Government derives an income of £30,000 per annum from the charter of its vessel m.v. "Forrest". However, this is largely offset by the running costs of the "Forrest" which are expected to amount to about £27,000 in 1975/76 according to the Estimates. If charges for depreciation and indirect overheads are added to the running costs, it is doubtful whether the revenue from the charter of the "Forrest" is sufficient to recoup total costs.

A revenue source which has appeared in the Falkland Islands Estimates for the first time in 1975/76 is seigniorage - in other words, revenue derived from the sale of coins. The Falkland Islands Government recently entered into an arrangement with the Royal Mint for the minting of coins to "proof" standards in both base metal and gold. The base metal coins are sold in sets at a price well above their face value. The intrinsic value of the gold coins is, of course, far higher than their face value and they are

also sold in sets at a premium price. The Government receives a royalty on sales. Unfortunately, market conditions were not favourable when the coins were launched in 1975 but, even so, the income in 1975/76 should amount to £50,000, a useful contribution to Government revenues.

The remaining sources of Government revenue are relatively small. Reimbursements are received from HMG in respect of the passage costs of overseas officers - these are expected to amount to £27,000 in 1975/76. Rents are received from letting Government houses and Crown Lands (£10,470 in 1975/76) and an annual contribution, currently £10,000, is made by the Dependencies to the cost of administration by the Falkland Islands Government.

The contribution of the Dependencies is, of course, very small in relation to the cost of running the Falkland Islands' administrative machine. The costs of some of the larger service departments (Education, Medical and Public Works) have already been mentioned in the foregoing text. The administrative core of the civil service - i.e. the Secretariat, Treasury and Central Store - is expected to cost £92,827 in 1975/76, approximately 10 per cent of total Ordinary Expenditure. The remaining departments are much smaller and less costly (e.g. Police and Prisons £17,754; Meteorological - £8,656).

The Government machine in the Falklands, as in many other parts of the world, is a favourite target for criticism by members of the public. The criticisms levelled at the Civil Service in the Falklands, as elsewhere, are that it is unduly bureaucratic, lacking in speed, reluctant to take decisions and inclined to generate paper-work rather than to initiate action.

The survey team did not conduct a special study of the local civil service. Nevertheless, it can be said that, in terms of the population it serves, the Falklands civil service machine is large. On the other hand, it has to administer a wide range of services, albeit on a small scale, and it is arguable, that, in relation to the range of services provided the Civil Service is not overstaffed. It clearly is not an easy task for a small

group of people to administer such a large number of activities, and there is inevitably a lack of expertise in certain areas. But it is possible that over rigid application of formal civil service methods might be inappropriate for such a relatively small government machine, and could be inhibiting the speed and efficiency of Government services. Organisational changes in the Civil Service (which should facilitate the introduction of any new methods) are discussed in Chapter 20 (Volume 2).

Development revenue and expenditure

Whereas the Falkland Islands are more or less self-sufficient in terms of ordinary (recurrent) revenue and expenditure[1] they do rely considerably on UK aid for funds to meet their development expenditure needs. Table 71 shows development expenditure in the Falklands over the past 10 years, differentiating between expenditure met from colony funds (16 per cent) and disbursements from aid funds (84 per cent).

In the ten financial years, 1965/66 to 1974/75 inclusive, the Falklands Government spent from its own funds a total of £273,600 on development. This total included loans (for housing, dairies, bakery and hotel) amounting to £43,500. Direct spending on housing amounted to a further £28,100. Communications, in their various forms, absorbed a large part of spending from colony development funds: £63,300 was spent on roads, £54,700 on internal aviation (including the purchase of aircraft), £42,000 on a cargo vessel and, more recently, £14,700 in connection with the temporary and permanent airfields and the fuel storage depot. A further £2,100 was spent on telecommunications. In the same 10-year period £16,000 was spent from local funds on schools and £9,200 on minor development projects.

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1 It should be noted, however, that OSAS payments under technical assistance are made in respect of a number of salaries included in recurrent expenditure.

Table 71. Falkland Islands Development Expenditure 1965/66-1974/75
(£'000)

A. Expenditure met from Colony Funds	1965/66	1966/67	1967/68	1968/69	1969/70	1970/71	1971/72	1972/73	1973/74	1974/75	Total
Housing	0.8	0.8	0.1	-	-	-	-	-	-	26.4	28.1
Schools	7.1	0.5	0.7	0.5	0.2	0.5	5.9	0.6	-	-	16.0
Roads	2.8	10.1	29.2	14.6	6.1	0.4	0.1	-	-	-	63.3
Aviation (internal)	-	49.4	0.2	0.5	-	-	4.6	-	-	-	54.7
Cargo vessel	-	23.6	18.4	-	-	-	-	-	-	-	42.0
Telecommunications	0.6	0.6	0.9	-	-	-	-	-	-	-	2.1
Airfields and fuel storage depot (assistance)	-	-	-	-	-	-	0.2	9.8	0.2	4.5	14.7
Minor Development Projects	1.3	1.1	1.5	0.8	1.2	0.1	0.4	0.7	2.1	-	9.2
Loans	-	-	-	-	17.6	4.4	7.4	6.4	2.6	5.1	43.5
	12.6	86.1	51.0	16.4	25.1	5.4	18.6	17.5	4.9	36.0	273.6

B. Disbursements from Aid Funds*	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	Total
Health	-	-	-	-	-	-	-	-	-	9.4	9.4
Housing	-	-	5.2	-	-	-	-	-	-	-	5.2
Schools	-	-	-	3.5	1.4	-	-	-	-	8.0	12.9
Transport (air and roads)	3.0	0.1	26.0	30.2	6.0	-	-	4.7	51.0	1,006.5	1,127.5
Agriculture	-	-	-	-	-	-	-	-	16.4	51.9	68.3
Trade and tourism	-	-	-	-	-	-	-	-	-	10.5	10.5
Power supply and electricity	-	-	4.5	-	-	-	50.0	-	100.0	-	154.5
Telecommunications	-	-	33.6	-	-	-	-	-	-	-	33.6
Minor Development Projects	4.0	10.3	(8.3)	-	2.1	14.0	-	0.2	-	15.4	37.7
	7.0	10.4	61.0	33.7	9.5	14.0	50.0	4.9	167.4	1,101.7	1,459.6

NB: Expenditure from colony funds is in respect of the financial years commencing July 1, whereas aid disbursements are in respect of calendar years.

* Excluding Technical Assistance.

Sources: A: FIG Treasury.
B: Ministry of Overseas Development.

In more or less the same period, the ten calendar years 1965 to 1974 inclusive, disbursements from UK aid funds in respect of development expenditure in the Falklands amounted to £1,459,600. The bulk of these disbursements was concentrated in the years 1971-74 when several large projects were commenced. The first of these was the electricity power station on which £150,000 was spent between 1971 and 1973. The second was the permanent airfield on which well over £1 million had been disbursed by the end of 1974. The third was the agricultural fencing subsidy which absorbed most of the agricultural disbursement of £68,300 in 1973-74.

Apart from these major projects, aid funds were disbursed on telecommunications, trade and tourism, schools, health, housing and minor development projects.

UK aid to the Falklands in the calendar year 1975 amounted to £983,000. The bulk of this disbursement was in connection with the permanent airfield which is expected to cost at least £4.2 million in total.

Up to 1973 all UK aid to the Falklands was in the form of outright grant, but in 1973 a loan of £100,000 was made to the Falklands Government to help fund the construction of the electricity power station. The UK Government also indicated that an allocation of Development Aid funds up to a maximum of £50,000 in each financial year from 1973/74 to 1977/78 would be made available to the colony in the form of soft loans. The terms of the loans are extremely favourable - interest free, maturing over 25 years and with a grace period of 7 years - and calculated to equate with a grant element of 76.6 per cent.

The permanent airfield is being treated as a special aid case and is being financed by outright grant.

UK aid to the Falklands is not limited to the project aid mentioned in the foregoing paragraphs. Bilateral technical assistance is also given to the colony. The disbursements in this respect over the last 10 years are shown in Table 72.

Much of the technical assistance is of a developmental nature and includes the cost of experts (some of whom are wholly financed by aid and others only in part), consultants and equipment.

It will be seen from Table 72 that the disbursements on technical assistance have been increasing annually, so that expenditure in 1975 (£98,700) was more than 10 times the amount spent in 1966 (£9,100). Total disbursements over the 10-year period amounted to £405,500.

It is apparent that the bulk of development expenditure in the Falklands in recent years has been financed by UK aid. However, the colony is capable of financing some development from its own resources and should continue to do so. The Colony Development Fund, which is available for this purpose, stood at £118,999 at June 30, 1974. In addition, there is a Reserve Fund which the Government apparently intends to merge in due course with the Development Fund. The Reserve Fund amounts to £102,245 and would constitute a valuable supplementary source of finance for the development of the Falklands.

Table 72. Disbursements of UK Bilateral Technical Assistance to the Falklands, 1966-75 (inclusive)
(£'000)

1966	9.1
1967	14.3
1968	18.7
1969	17.7
1970	31.6
1971	42.1
1972	42.2
1973	53.7
1974	77.4
1975	98.7
Total	405.5

Source: UK Ministry of Overseas Development.

The outlook for Government revenue and expenditure

In view of the sensitivity of Government recurrent revenue to the fluctuating market price of wool and the apparently inexorable annual increases in Government recurrent expenditure (at current prices) it seems inevitable that difficulty will be found in balancing the budget in future except in good years when high wool prices and healthy farm profits are reflected in enhanced Government tax revenues.

The outlook for the financial year 1976/77 is not encouraging. Forecasts of revenues and expenditures prepared by the Financial Secretary indicate a deficit of £270,000 for the year, as compared with an estimated surplus of £228,000 in 1975/76. Total recurrent revenue is expected to fall by £291,000 largely because of lower tax revenue. Total recurrent expenditure, on the other hand, is expected to increase by £207,000. The Financial Secretary's forecasts may well be based on slightly pessimistic assumptions, and they do not take into account possible new Government measures designed to raise more revenues or to restrain expenditures. Nevertheless, they indicate that the Government will find it extremely difficult, if not impossible, to balance its budget in 1976/77.

There is not a great deal that can be done in the short term to enhance the recurrent revenues of the Falkland Islands Government. The survey team has examined all the possibilities and these are summarised in the paragraphs which follow.

Tax revenues. The scope for improving Government revenue by increasing personal taxation in the Falklands is decidedly limited. While the level of taxation is lower than that of the UK the services provided by Government are also generally of a lower standard and less comprehensive. It would be difficult to justify measures which would substantially increase the burden of taxation on Falkland Islanders. Personal tax rates in the Falklands are given in Table 73.

Table 73. Falkland Islands' Personal Tax Rates

Chargeable Income (£)	Rate (%)
First 500	15
Next 500	20
" 500	25
" 1,000	30
" 1,000	35
" 1,000	40
On excess over £4,500	45

Source: FIG Treasury.

The initial rates of taxation are low by the standards of most countries, but on the other hand the allowances given to individuals are relatively small (e.g. personal allowance £230, wife allowance £150) so that the tax threshold is low and most individuals are caught in the tax net. Earned income relief and old age relief are given and there is a good case for giving small income relief especially if there is to be an increase in the rates of personal taxation. A modest increase in personal tax rates would yield useful additional revenue and should be considered by Government. At the same time an attempt should be made to assess benefits-in-kind on a more realistic basis with a view to removing the "inequalities in the burden of taxation" to which the Comben and Waller Report referred.

The company rate of tax is at present 40 per cent. This is levied on the taxable profits arising in the Falklands of all the companies which operate in the Islands, whether or not they are registered in the Falklands. The UK companies, in practice, offset the tax payable to the Falklands Government against their tax bill in the UK. The Falkland Islands' companies tax rate is, of course, lower than the equivalent rate in the UK. (52 per cent) at present.) But the capital allowances given to companies in the UK are far more generous than the allowances given in this respect in the Falklands, which have not been revised for very many years.

An increase in the company rate of tax seems appropriate and would provide the Government with extra revenue which could be substantial in a "good" year, but any such increase should be accompanied by a substantial upward revision of capital allowances.

Philately. Philatelic revenue has for many years constituted a significant part of Falkland Islands Government revenue. Estimates of net philatelic revenue over the past 10 years are given in Table 75.

Table 74. Falkland Islands' Philatelic Revenue Estimates*

	£
1965/66	17,942
1966/67	8,043
1967/68	9,494
1968/69	54,640
1969/70	17,056
1970/71	35,200
1971/72	15,223
1972/73	30,144
1973/74	34,658
1974/75	64,278

* These are approximate since it is difficult to separate with any precision the profit made on this activity from the loss which is incurred on normal postal activity.

Source: FIG.

It is apparent that the revenue from philately does tend to fluctuate from year to year and much depends on the opportunities which arise to make commemorative issues. Much also depends on the effort which is put into the marketing of the stamps. The production and marketing of Falkland Islands stamps has hitherto been handled by the Crown Agents who have traditionally managed the philatelic business of the Crown Colonies. Naturally enough, the Crown Agents do not give special attention to the marketing of Falkland Islands stamps: these are distributed through the normal channels used by the Crown Agents, like the stamps of any other of the many territories whose philatelic sales they handle.

In 1974 inquiries were initiated into a possible alternative method of marketing Falkland Islands' stamps. This involved the appointment of a dealer to handle the marketing in a much more individual and aggressive way. There is little doubt that a fresh marketing approach of this kind could significantly increase the revenue derived by the Government from philately, but there are opposing schools of thought on the wisdom of such a move in the longer term. Purist philatelists - such as the Falkland Islands Philatelic Study Group - argue that the marketing devices which would be employed by a dealer appointed as agent to the Government would bring the colony's stamps into disrepute. They say that philatelists would

eventually cease to collect Falkland Islands stamps and, after a few boom years, philately would be lost altogether as a source of revenue to the Government. This could happen, undeniably, if the Falklands Government, or its agent, pursued a marketing policy which utterly disregarded the interests of serious philatelists, for example, by making frequent irrelevant commemorative issues. However, the supporters of a more aggressive marketing policy for the Falklands argue that it is possible to steer a middle course which would reconcile the Government's need for additional philatelic revenue with the philatelists' desire to preserve both the integrity of Falklands stamps and the value of their own collections. Such a middle course would allow a dealer to bring fresh impetus to the marketing of Falklands stamps and would, at the same time, vest ultimate control over the key issuing decisions in the Falkland Islands Government. In such a case it would, of course, be essential to ensure that the terms of the contract between the Government and the dealer/agent would prevent unilateral actions, harmful to the colony's philatelic reputation by the latter, while still allowing him sufficient flexibility in executing his marketing strategy.

Coinage. As explained in the foregoing section of this chapter, the timing of the Falkland Government's entry into the market for coins was unfortunate. However, the income derived from the sale of coins to date, although less than anticipated, is not insignificant, and the issue of commemorative coins as opportunities arise in future should still provide the Government with useful additional revenue from time to time.

Import duties. The import duties currently levied on alcoholic drinks, tobacco and matches are an important source of Government revenue and should continue to be so. There is some scope for increasing Government "take" from this source, and it should be possible to increase the rates from time to time. At present, the duty on beer seems relatively low (11p per gallon). If this rate were doubled it would provide useful additional revenue and add only 1p or so to the price of a can of beer.

The imposition of ad valorem duties on selected luxury articles is potentially a good source of additional revenue for the Government. The survey team endorse the recommendation made in the Comben and Waller report in this respect.

Charges for services. It has already been pointed out in the first section of this chapter that the Government does not always cover the total cost of services provided to the public even in those cases where the aim is to break-even. Stanley rates, which are intended to cover the whole cost of municipal services, are a good example of this. In the computation of charges for such services there is, therefore, a case for taking into account not just the direct operating costs but also such elements as depreciation of assets and overhead expenses.

Where the Government intends to subsidise a service, it should still compute the true total cost in order to become aware of the precise extent of the subsidy. Some charges have not been revised for many years (the aviation mileage charge being a case in point) which means that the subsidy element increases as costs increase, other things being equal.

State lottery. It has been suggested from various quarters that the Falklands Government should launch a state lottery, on the lines of the Maltese lottery or the Gibraltar lottery, as a means of raising more revenue. The idea merits some consideration since the lottery is undoubtedly a valuable source of revenue to the Maltese Government, and the Gibraltar Estimates for 1975/76 show an estimated profit of £190,000 on anticipated gross lottery proceeds of £983,000.

Clearly, a Falklands lottery would have to be largely postal and would presumably be aimed at a world market (though the UK could not legally be included). A wholly reliable and frequent postal service would therefore be a pre-requisite to success and it is doubtful whether the present postal service to and from the Falklands is adequate for the purpose. Both Malta and Gibraltar are obviously better served in this respect and they are also nearer and better linked to most of the prospective markets.

A second pre-requisite to success is the acquisition of "know-how" in relation to the sale of tickets, security precautions, and so forth. It is

obviously important to acquire the necessary expertise before launching a lottery and this is impossible to obtain except from competing lotteries who are understandably reluctant to divulge their secrets.

Even if the "know-how" could be acquired the communications problems would probably rule out a Falklands lottery at present. However, it is a potential revenue source which may merit further investigation, at some future date.

Tax haven. Another revenue-earning device which is frequently mentioned in relation to the Falklands is the development of the colony as a tax haven. In the thirty years since the end of the second world war many places have acquired reputations as tax havens. From their various experiences a list of criteria[1] for success as a tax haven can be drawn up:

1. In the first place a tax haven must have low, or no, taxes on at least one important category of income. Thus, in order to qualify as a tax haven the Falklands Government would have to relinquish a major part of its present revenue and it would have to be fairly confident that the fresh revenues which would be generated by the businesses and/or individuals attracted to the Islands would at least compensate for the lost income.

2. A tax haven must have political stability. Although the Falklands are internally stable, the political difficulties with the Argentine would tend to inhibit their development as a tax haven.

3. A tax haven must be accessible both physically and legally. The remoteness of the Falklands would tend to place them at a disadvantage in this respect and the relative infrequency of the air service would also be regarded as a disability.

4. A tax haven with a warm climate has a distinct advantage over others. This is especially true in the case of individuals, and the Falklands would clearly be less attractive than a competing tax haven in a warmer climate, other things being equal.

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1 See: "Tax Havens and Their Uses" by Caroline Doggart (EIU, 1975).

Many other criteria vary according to the need of the tax fugitive. However, it is clear that the Falkland Islands do not satisfy the main requirements sufficiently to enable them to compete with the large number of established tax havens which vie with each other for business. It therefore seems highly unlikely that the Falklands could be successfully developed as a tax haven.

Even if the Falklands possessed obvious advantages as a potential tax haven, it would be necessary to consider very carefully whether the changes which would be brought about by an influx of tax fugitives, whether individuals or companies, would necessarily be desirable from the Islanders' viewpoint.

CHAPTER 16 - THE FALKLAND ISLANDS COMPANY AND THE ECONOMY

BACKGROUND

The Falkland Islands Company was incorporated by Royal Charter in 1851, having acquired the area now known as Lafonia on East Falkland in the same year. It subsequently acquired extensive tracts of land throughout the Islands, and developed shipping and merchanting activities. FIC remained an independent public company until mid-1972 when it was taken over by Dundee, Perth and London Securities Ltd, part of the Slater Walker group. In November 1973 Dundee, Perth & London Securities was purchased, as part of a programme of diversification, by Charrington, Gardner Locket Ltd. Thus FIC is now a subsidiary of Charringtons. FIC itself has one major direct subsidiary company - The Falkland Islands Trading Co Ltd, which in turn has a number of wholly-owned operating subsidiaries:

- Darwin Shipping Ltd (incorporated in the Falklands);
- Southern Ships Stores Ltd;
- J.G. Boyes (Vending) Ltd;
- J.G. Boyes (Warehousing) Ltd;
- H.W. Goodwin Ltd.

In addition to its wholly-owned subsidiaries, FIC has a 50 per cent holding in David Smith & Co Ltd, a Bradford wool merchant and processor.

FIC's activities are not confined to, or exclusively connected with, the Falkland Islands. Four of the operating subsidiaries mentioned above are engaged entirely in UK activities which include ship-chandlering, warehousing and automatic vending machines. These subsidiaries were acquired by FIC with funds generated by its farming activities in the Falklands in order to broaden the company's income base and thus provide a cushion against low farm profits at times of depressed wool prices.

POSITION IN THE FALKLANDS ECONOMY

There is no doubt that the FIC plays a dominant role in the Falkland Islands' economy similar to that of other colonial trading companies in the early stages of development of their respective territories. In addition to its ownership of 46 per cent of the Islands' farm land its contribution, influence and control extend to:

- production of almost half the Island's wool output;
- employment of about one third of the Island's total workforce;
- control and management of the Island's external sea freight service;
- management of the coastal shipping service;
- a dominant position in retail distribution;
- conduct of the sale of most of the Island's wool clip;
- payment of substantial contributions to the FIG in company tax;
- influence over farming, outside its own farms, through directors' interests in two of the largest independent farms and positions held in the Sheep Owners' Association.

These various activities are discussed in the appropriate chapters, notably Chapter 5, Manpower; Chapter 6, Agriculture; Chapter 10, Transport and Communications; and Chapter 11, Distribution and Services. Reference should also be made to Chapter 3, The Economy, particularly the sections on Investment.

Financial results

To give some idea of the scale and profitability of FIC's operations, the company's financial results for the three most recent years are summarised in the Table below.

Figure 9

FALKLAND ISLANDS COMPANY ACTIVITIES RELATED TO THE FALKLAND ISLANDS

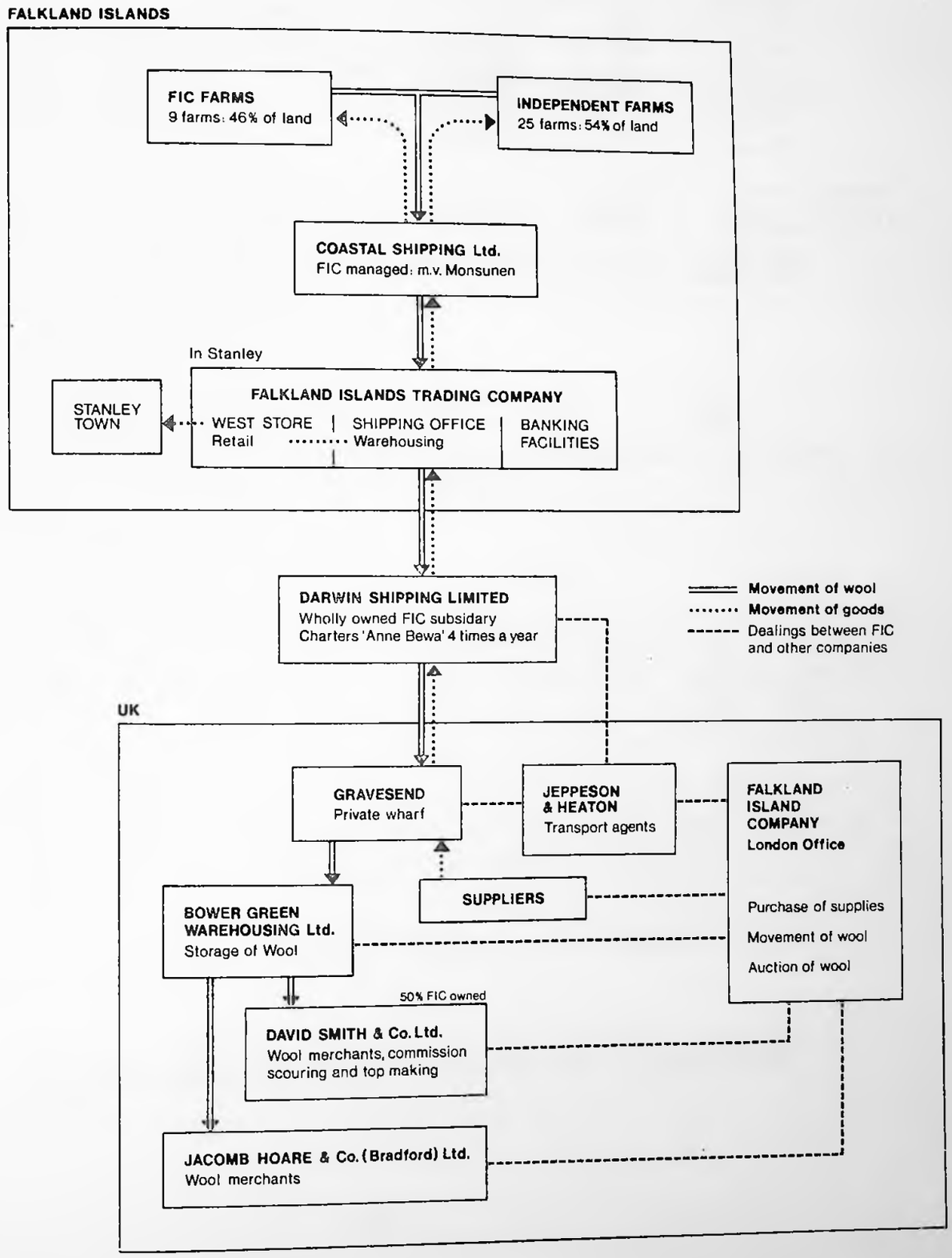

Table 75. FIC: Summarised Profit and Loss and Appropriation Accounts

	Years ended December 31			
	1974	1973	1972	
	(£)	(£)	(£)	
Turnover	1,769,120	1,278,899	932,141	
Trading profit	496,989	386,726	174,309	
Income from investments	54	100	13,179	
Bank and other interest	98,834	51,698	11,902	
Dividends from subsidiaries	140,000	67,500	76,610	
Pre-tax profit	735,877	506,024	276,000	
Profit after tax	427,773	295,462	193,106	
Appropriations:				
Preference dividend	1,155	1,155	1,650	(gross)
Ordinary dividend	444,166	307,000	123,680	(gross)
Capital employed:	4,022,578	3,942,472	1,665,449	
Ratios:				
Trading profit as % of turnover	28%	30%	18%	
Pre-tax profit as % of capital employed	18%	12%	16%	

Source: FIC Annual Directors' Reports.

Commentary on financial results

1. Overall performance. FIC's recent results are extremely satisfactory by most commercial standards. Turnover, trading profit, pre-tax profits and equity earnings are all on a firmly rising curve. The key financial performance ratios demonstrate this and it will be seen that 1974 was an extremely good year. The slight dip in the profit/capital employed ratio in 1973 was due to a major revaluation of fixed assets (from £373,124 to £3,158,907) which increased capital employed by £2,785,783.

2. Trading profit. This arises largely, but not entirely, in the Falkland Islands.

3. Dividends from subsidiaries. These are largely related to UK activities.

4. Investment income. Prior to 1972 FIC had an annual portfolio investment income of about £20,000-£25,000. This virtually disappeared in 1972 when the Slater Walker Group took over FIC and the investments were transferred to the parent company. (Book value £320,466 and Market value £489,607 at 31.12.71.)

5. Appropriations of profits. In both 1973 and 1974 distributions by way of dividends exceeded post-tax profits.

6. Taxation. While FIC, like any other UK registered company, is subject to UK corporation tax, it is given relief for overseas tax (i.e Falkland Islands company tax) paid. In 1974, this amounted to £208,000, in 1973 to £153,110 and in 1972 to £76,050.

The role of FIC

Following our review of the Falkland Islands' economy and interviews with FIC directors and managers, we believe that FIC is mindful of its dominant position in the Islands and is conscious of the need to reconcile corporate profitability with the wider interests of the Islands and the Islanders.

Our detailed comments in the foregoing chapters indicate that the company is open to criticism but it is only fair to point out that, in the agricultural sector, these also apply to the other farming companies. There are clearly potential risks to the Falkland Islands as a whole in any one particular private sector organisation holding a monopolistic or near-monopolistic position in shipping, merchanting and wool-marketing. However, the company is not insensitive to criticisms which have been levelled at it and appears to be considering appropriate changes.

It would seem to make good sense for the Falklands Government to encourage competition, where this can be economically justified, in those areas of activity in which FIC enjoys a monopoly or near-monopoly.

Furthermore, it should be carefully considered, in the light of the dominant role played by FIC in the economy, whether the Falklands Government ought not to be in a position to influence, if not to control, the company's policy. The manner in which this can best be achieved raises problems which are not unknown elsewhere. We hesitate, therefore, to put forward a particular institutional solution. It may be that Government representation through a nominee director might well serve a useful purpose, but we would much favour a frank discussion between the Falklands Government and the FIC with a view to finding a solution which ensures, so far as possible, that the public interest is safeguarded.

APPENDIX 1 - NOTE ON ROAD CONSTRUCTION METHODS, COSTS AND BENEFITS

LOW COST ROAD CONSTRUCTION

There are a number of different methods of construction - both technically and organisationally.

Depending on the type of terrain, the main technical options for low cost roads are listed below. For each, maximum use would be made of locally-available decomposing rock, beach gravel and sand.

1. Cut and fill. This method, which is to be used on the airport road, involves removal of vegetation and peat/top soil down to a firm base. The trench is then filled with crushed rock, to a thickness dependent on desired carrying capacity, surfaced with gravel. and compacted. Side drains and turnouts are required.

2. Surface on existing ground level, with or without side drains. A number of variants are possible:

   a. surface on existing vegetation with fill material excavated from deep-dug side drains or nearby borrow pits, gravel surface material usually added and the whole compacted;
   b. surface on existing vegetation with crushed rock, from nearby quarry, and gravel surface material added and compacted as in 1, with or without side drains depending on the terrain;
   c. as in (b) but with strengthening material laid on the existing vegetation ("corduroy" roads). The material could be bushes, rough hewn plants or a patent (plastic) grade-separation material;
   d. artificial consolidation of peat by roller and fill material added as in 1.

3. Concrete strips, with or without side drains. Two trenches are cut and filled with sand, crushed rock and finally concrete. Thickness depends

the desired strength and soil condition. Roads would be constructed to 3-3.5 metres widths, with 6 passing places per mile if designed for light traffic, or to 4.5 metres widths for heavier traffic.

APPENDIX 2 - TOURIST EXPENDITURE

It is assumed that local tourist expenditure in the Falklands would be broken down as shown below. Comparison is given with that of the Bahamas.

	Falkland Islands	Bahamas
Hotel/meals	65%	64%
Local travel	20%	8%
Shopping/incidentals	15	28%
Total	100%	100%

It is assumed that in terms of total expenditure, the relatively high cost of local travel in the Falklands would partially compensate for the lack of locally purchasable souvenirs/entertainments etc. The local retention element of tourist expenditure is estimated as follows:

a. Hotel*/meals

	Expenditure breakdown	x	Retention factor	=	Local retention
Wages	35%		. 6		21.0%
Consumables	25%		.25		6.2%
Gross profit*2	40%		. 3		12.0%
					39.2%

* Includes lodges and chalets. *2 Includes Depreciation. The retention factors are estimates based on considerations of local tax element, savings, proportion of imported materials of total consumables and degree of local investment etc.

b. Local travel

	Expenditure breakdown	x	Retention factor	=	Local retention
Wages	50%		0.6		30%
Consumables	15%		-		-
Gross profit	35%		0.5		17.5%
					47.5%

c. Shopping/incidentals

Total retention in this category is assumed to be 60%. Although a small proportion of total tourist expenditure, it is assumed that the items purchased will mainly be locally produced souvenirs, goods etc.

So that total retention of tourist income is calculated as follows:

Hotel/meals	65%	x	.392	=	26%
Local travel	20%	x	.475	=	9.5%
Shopping incidentals	15%	x	.6	=	9%
Total					44.5%

or rounding off
Total retention = 45%

APPENDIX 3 - ECONOMICS OF WIND POWER

Three cases were studied namely:

a. As a fuel saver. Until recently a typical medium-sized wind turbine, the Electro 6 Kilowatt machine complete with necessary fittings had a delivered cost in the Falklands of approximately £3,200. There is now on sale a 7½ Kilowatt Wesco model, with the added attraction of constant 240 volt AC output through its variable ratio gearbox, which is on sale for £2,150 with a freight and installation cost of about £250. Although power could be drawn all day, which would put up the average settlement consumption by about 15 per cent, in practice it would only be utilised from 6 am to 10 pm. So that, although the 6 kilowatt wind generator of the type manufactured by Electro, in an average wind speed of 16[1] mph has a theoretical total average output capability of about 50 kilowatt hours/day or 2.1[2] kilowatt hours/hour, its useful output is limited by the daytime offtake. This takes variation of wind speed into account.

The evening period is also when a wind generator would be giving less than its average output of power because the wind tends to drop in this period of the day in the Falklands. Combining these two effects the 'useful' output of a 6 kilowatt wind generator would be further reduced:

Useful 6-10 pm output = 4 x 2.0 x 0.80	=	approx 6.4 kilowatt hours
Daytime consumption on medium size (10 houses) settlement	=	approx 4.6 kilowatt hours
Total useful output of 7½ kw	=	11.0 kilowatt hours/day
wind generator	=	4,015 kilowatt hours/year.

Amortising the capital cost of the wind generator at 12 per cent taken as the commercial borrowing rate, over 15 years, gives an annual capital recovery cost of:

£2,400 x .146	=	£350/year
Capital cost recovery necessary in electricity price	=	8 p per kwh

1 This is taken as a typical average wind spread for a Falkland camp settlement. 2 The 5 metre propeller Wesco machine output would be slightly below this figure, say 2.0 kilowatt hours/hour.

@ high load, average fuel consumption of 6 kw diesel generator	=	approx 0.16 gallons/kilowatt hour
@ low load, average fuel consumption of 6 kw diesel generator	=	approx 0.22 gallons/kilowatt hour
∴ Weighted average generator fuel consumption	=	0.19 gallons/kilowatt hour.
In addition, lube and maintenace cost savings of not running diesel generator	=	approx 1 p/kwh
∴ Breakeven diesel fuel price, when purchase of wind generator can be economically justified	=	37 p/gallon

Degree of error estimated at + 25%.

For the 6 kilowatt DAF vertical wind generator, costing some £3,200 including an AC inverter, the breakeven price would be about 53 p/gallon if a similar power output is assumed.

b. As an alternative purchase to a diesel generator. This is a situation when a farm requires a new 6 kilowatt electricity generating unit and has the option of buying a diesel or wind powered generator.

The economics of comparing capital recovery costs of the wind turbine with operating costs of a diesel generator are the same, but in this case the capital recovery costs of the 6 kilowatt diesel generator must also be considered:

On annual basis = £870 x 0.146 = £127 = 2 p/kilowatt hour generated*.
So that breakeven diesel fuel price = 35 p/gallon + 25%

---

* Estimated on a 'useful' output basis to be 20 Kilowatt hours/day.

c. As a fuel saver when linked to a battery system. In this situation the full rate output of 7½ kilowatt wind generator can be utilised i.e. 50 kilowatt hours/day. The lost daytime output will drain down in the peak evening period.

The cost of purchasing a battery system to store the lost output of 39 kilowatt hours would be about £700, allowing a 15 per cent safety

margin[1]. In addition an AC inverter would need to be installed at a further cost of some £300 - both these additions of electrical equipment would reduce the actual power output by some 25 per cent.

So that breakeven diesel fuel price with battery system = 18 p/gallon
If a battery system is already in place
breakeven price = 11 p/gallon

In areas where average wind speeds are 13-14 mph, average daily output of the Wesco machine described is cut by about 25 per cent, so that the breakeven diesel price at which a wind generator plus battery system would be economically justified would be raised to about 24 p/gallon.

1 This battery storage is not sufficient to remove the need for a back-up diesel generating system.

Printed for Her Majesty's Stationery Office by Robendene Ltd. Chesham.