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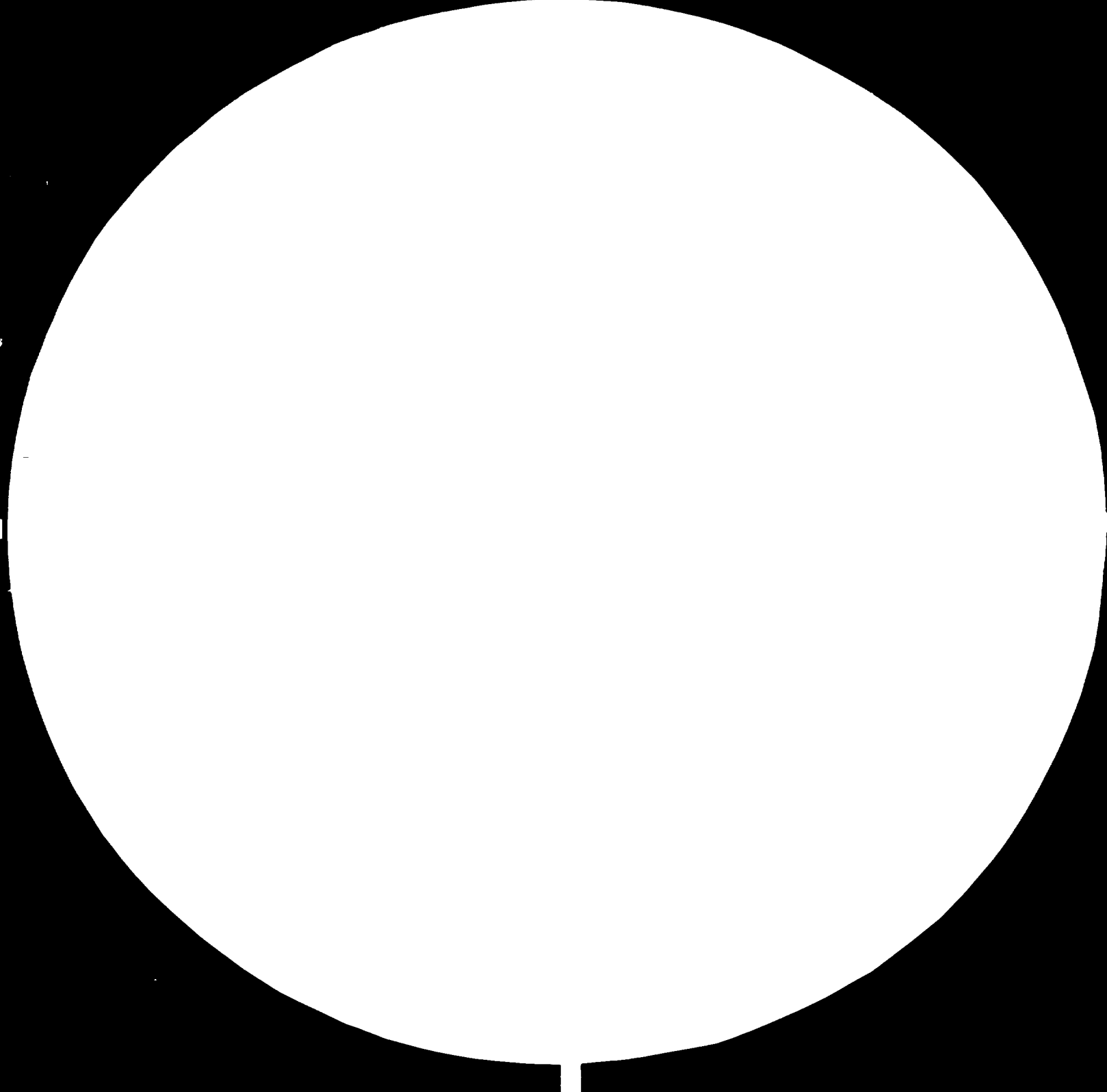
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Ministry of Finance of Vanuatu
Office for the Development and Promotion of Vanuatu Enterprises O.D.E.

Vanuatu Cement Industry,
Market and Plant Capacity.

prepared

by

Mr. Rudolf Eder

for the

United Nations Industrial Development Organization

This report has not been cleared with the United Nations Industrial Development Organization (UNIDO) which does therefore not necessarily share the views presented.

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I. INTRODUCTION

1.1. The Cement Project

Vanuatu like the neighbouring countries - apart from Fiji - has been importing cement from Europe, Japan, New Zealand, Australia etc. at a high C.I.F.-price. The actual consumption of cement is low, but an accelerated development would require considerably increased quantities of cement, depending certainly on the price too.

On the other hand Vanuatu has apparently excellent conditions for a local cement industry: pure raw materials and a natural harbour.

These facts together with the overall development targets of the Vanuatu Government render the idea of a Vanuatu Cement Industry worthwhile to be studied in more details.

After some discussions in April and May 1981 the Minister of Finance, M.Kalpokor Kalsakau agreed with a proposal made by O.D.E. to develop the Vanuatu Cement Industry. The following phases have been agreed upon:

- First phase: Market study
- Second phase: Technical feasibility study
- Third phase: Economic analysis and evaluation of the project
- Fourth phase: Negotiations within the Government and of the Government with potential foreign investors and partners to prepare the investment decisions.
- Fifth phase: Implementation of the project

The market study was scheduled to start on June 17 and to be finalized in Vienna. In case of a positive result phase two and three should be executed as soon as possible with the assistance of UNIDO.

At the same time a private group is supposed to investigate by its own in order to make a comprehensive proposal to the Government on how to develop the cement industry in Vanuatu. This proposal should be evaluated, compared with the results of the UNIDO-study and discussed with the concerned parties (phase four). The information provided through the UNIDO feasibility study should allow the Government to take the best decision in the interest of Vanuatu.

1.2. Objectives of the present study

The immediate objective of the present study is to provide the necessary information to take a decision on the further development of the cement project, i.e. on phases two and three of the development. Other objectives are

- to characterize the cement market,
- to estimate and analyse the potential market,
- to help to define the plant capacity,
- to show and discuss possible marketing strategies,
- to recommend further steps;

2. CEMENT IN GENERAL

2.1. Some characteristics of cement industry

Cement is a basic product and as such the natural starting point of a long number of applications like constructor's work, with concreting on site, or prefabricated modules for constructional purposes. All the important fields of application have one feature in common: whoever uses the cement must be able to rely on its quality and homogeneity.

Quality and homogeneity must secure that the customer achieves the same results every time, because only in such case it is possible to rationalize and industrialize the production of concrete.

In addition to quality and homogeneity cement must be available at a low price to become really a basic product. This line of thoughts leads to the necessity of operating with relatively big production units.

The economies of scale are considerable in the cement industry. In order to benefit from them, a large market is needed. Cement is relatively cheap per weight unit compared with other products, and the costs of transport and handling are heavy in comparison with the price. This previously resulted in the establishment of a large number of rather small cement works, which covered the supplies of local and, as regards transport, protected markets, and further the establishment of a trade distribution system based on relatively small districts, each being cut off from the neighbour districts by the large handling costs.

Through the latest decades the technology of production of cement has developed towards bigger and bigger production units as a prerequisite of reducing the production cost in the competition with other cement industries, and also as a modest contribution towards the improvement of the competitiveness of concrete as compared with other building materials. The cement industry is highly capital intensive. Financial costs are correspondingly high; and so it is of vital importance that the costs of construction are highly degressive in relation to the size of plant. In addition, the direct cost of each ton is lower for the big production units.

The result of this trend is that the unit sizes now reckoned with are 2 to 3.000 tons per 24 hours and more, whereas a works having a capacity of 500 tons per 24 hours was considered a big and economical unit 20 years ago. Consequently the cement industry must be interested in expanding its market, either by enlargening the geographic dimensions, or by increasing the market share and the consumption per capita.

The geographic size of the market for cement depends to a large extent on the transport facilities and the distribution system. Up to the 1950's, 4.000 tons of bagged cement in a single ship for overseas destinations was considered a great shipment, nowadays we see a trend towards shipment of cement of clinker of 25 - 30.000 tons per lot, at rates which are much lower than what is charged for delivery of cement in bags to the same destination. This is connected

with the very efficient and fast loading and unloading which bulk carriers offer (1,000 tons per hour). This implies however that sender and receiver dispose of deep-water harbours and invest considerable sums in the handling installations required. This often leads to the installation of clinker mills near the centres of consumption.

In order to secure full capacity utilization of a large production unit - the only way to enjoy economics of scale - the cement industry must be interested in any progress that the cement consuming industries may enjoy. In certain cases vertical integration is necessary or highly recommended:

- establishment of and participation in clinker mills near the centres of consumption;
- promotion of concrete industries of any kind (pipes, prefabricated building works);
- promotion of linked industries like asbestos cement works;

Looking at the forward linkages of the cement industry, its importance for economic development becomes evident. In fact, cement plays a strategic role and represents the key for infra-structural development. A local cement industry can - provided it is run economically - stimulate, facilitate and accelerate the implementations of many other industries.

2.2. The world cement market

The total world cement production and consumption have grown considerably from 1913 to the present. The present production is more than twenty times higher than the production in 1913. Figure I shows the development of cement production during this period. Two world wars and the economic crisis between the two wars have seriously hampered and delayed the development. But from 1947 to 1977 the production increased in the average by 8 %. If we calculate the average growth rate for each decade we find that it decreases from 11 % for the period 1947/57 to 7 % for 1957/67 and to 5 % for 1967/77. It is not surprising that the effective change from year to year is neither equal nor continuous, but fluctuating within minus 0,2 % from 1973 to 1974 - the year of the energy crisis - and 19 % from 1947 to 1948 - a year of post-war recovery. Table I shows the growth rates from 1947 to 1977 and the average growth rates.

There is some evidence that cement consumption in industrialized countries is approaching saturation at a very high per capita consumption. It seems to be logic that developing countries will contribute most to future growth in cement production taking into account the fact that most developing countries' per capita consumption of today corresponds to the per capita consumption of industrialized countries during the period 1920 to 1950.

Table I: Total world cement production, its growth rates and trade

Year	Production in 1.000 t	Growth rate in %	Average growth rate	Trade
1913	39,5			4,7
1920	32,2			3,3
1922	42,6			3,5
1927	68,8			6,2
1932	52,3			4,4
1937	82,9			6,2
1938	86,7			5,7

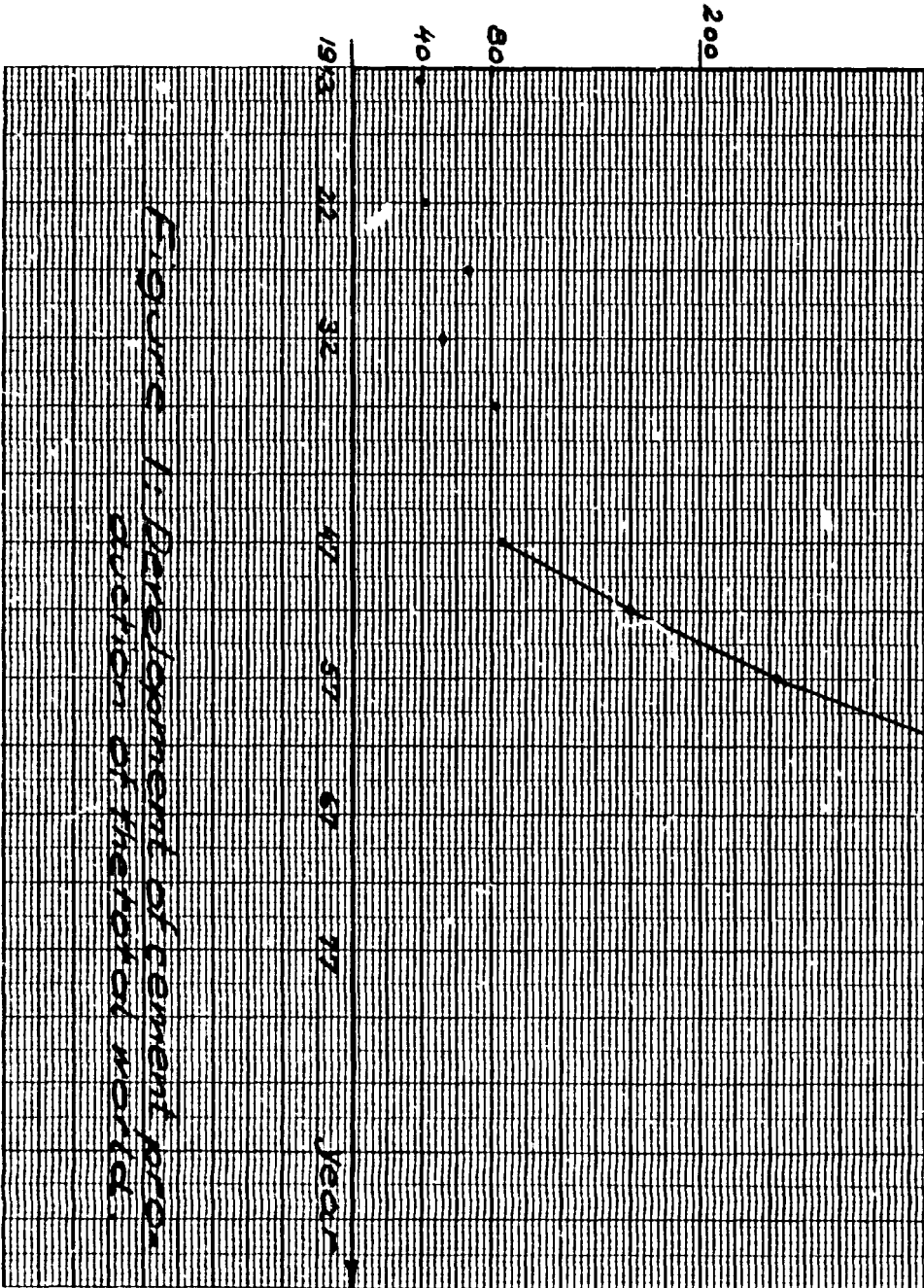


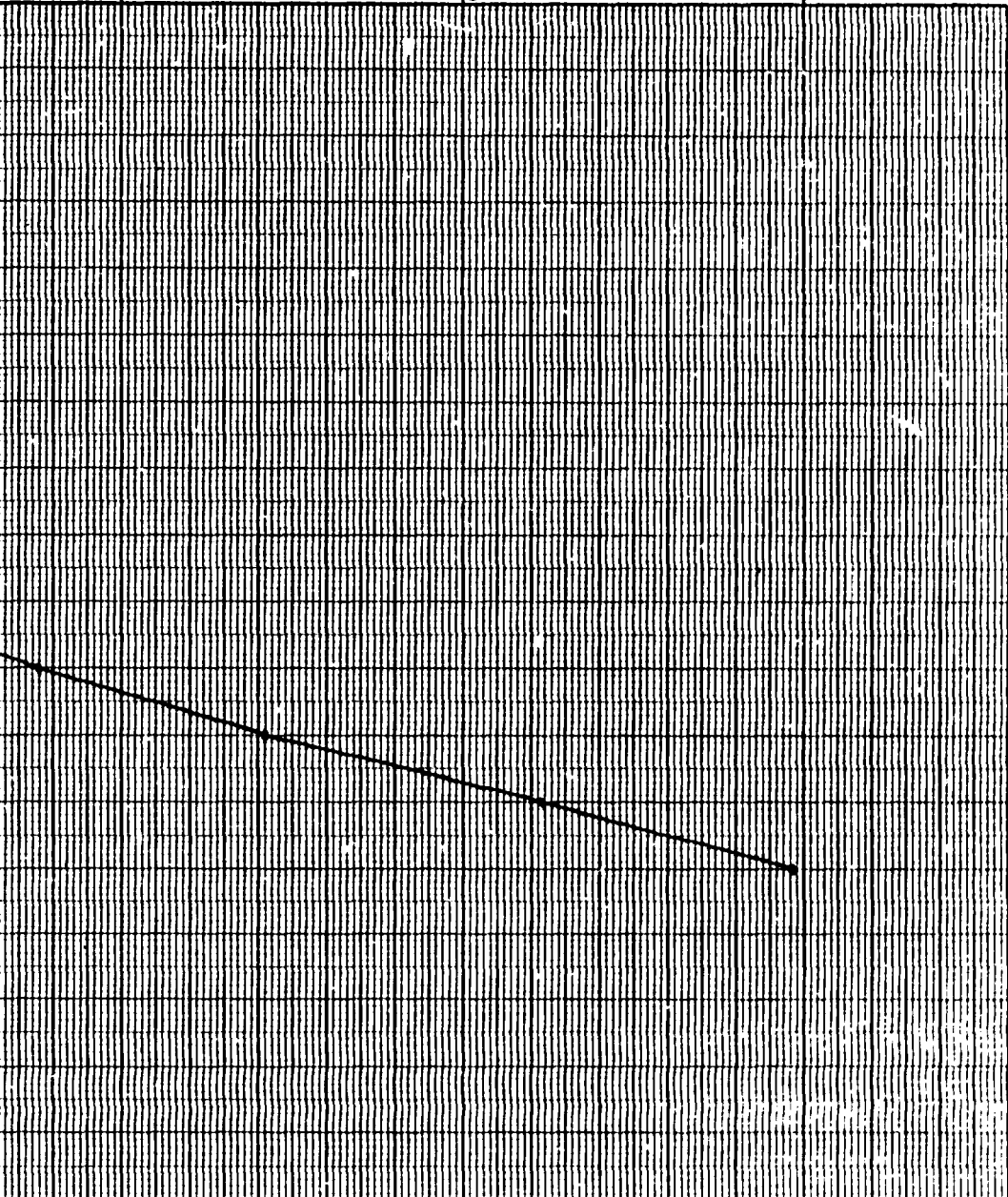
Figure 1: Development of cement production of the world.

Production
in 1000 t

800

600

400



1947	36,1			4,5
1948	102,1	19		6
1949	117,2	15		7,7
1950	133	13	1947 to 1957:	8,1
1951	150,2	13	11 %	10,2
1952	160	7		10,2
1953	178,7	12		10,7
1954	193	8		10,2
1955	214	11		12,8
1956	232	8		12,2
1957	244	5		11,8
1958	260	7		9,5
1959	291	12		11,3
1960	314,2	8	1958 to 1967:	11,2
1961	325,2	4		12
1962	352,5	8	7 %	12,4
1963	370,5	5		13,6
1964	410	11		15,7
1965	430	5		19,1
1966	466,3	8		19,9
1967	485,6	4		19,6
1968	526,5	6		20,3
1969	550,3	7		22,2
1970	589,5	7	1968 to 1977:	23,5
1971	634,1	8		28,4
1972	676,5	7	5 %	29,6
1973	717,5	6		34,4
1974	716,0	-0,2		35,5
1975	719,0	0,4		39
1976	752,0	5		44,2
1977	794,0	6		55

The figures on trade show (see table 1) that cement is a typical local good. It is produced and consumed at the same place (country). Only less than 5 to 10 % of total production are part of international trade.

2.3. Cement consumption and economic indicators

Correlation analysis helps to identify and to measure the direct relationships between different independent variables and cement consumption as the dependent variable. The most important index number for cement consumption is the consumption per capita (c.p.c.). Figure 2 shows the development of c.p.c. of cement from 1920 to 1977 for selected countries and regions. The development of c.p.c. of cement follows-in principle- the same curve as the development of c.p.c. of other products, i.e. somehow an s-curve with a rather slow start, a marked increase and saturation. The development of c.p.c. of cement of Austria, Western Europe and the total world shows exactly the very curve. Developing countries are probably 10 - 30 years behind. Their ups and downs are not significant, but rather irregular depending on big projects.

Nevertheless, it may be assumed that their c.p.c. will increase to 300 kg or more within 10 years.

Figure 3 shows the relationship between the consumption per capita of cement and the GDP per capita. The degree of relationship is high enough to make some predictions. But one may argue that the cement consumption p.c. of developing countries will increase more rapidly than the correlation between consumption p.c. and G.D.P. p.c. would suggest. In fact, little can be said on the correlation for countries passing from a GDPp.c. of less than 500 US\$ to a GDPp.c. between 500 and 3.000 US\$. But taking into account other factors, we may find arguments to defend the above assumption. In a case like Vanuatu there is a big demand for better housing, industrial premises and infrastructure, esp. wharves, all factors indicating that consumption p.c. of cement should increase considerably, particularly, if it is facilitated and encouraged by a local cement works. Cement and cement products may substitute a number of imported goods thus increasing consumption of cement more rapidly than G.D.P.

If the growth rate of G.D.P. varies between 3 and 8 % - both very plausible rates for Vanuatu - the growth rate for cement consumption may vary between 5 and 12. A growthrate of 12% would triple the present consumption within 10 years.

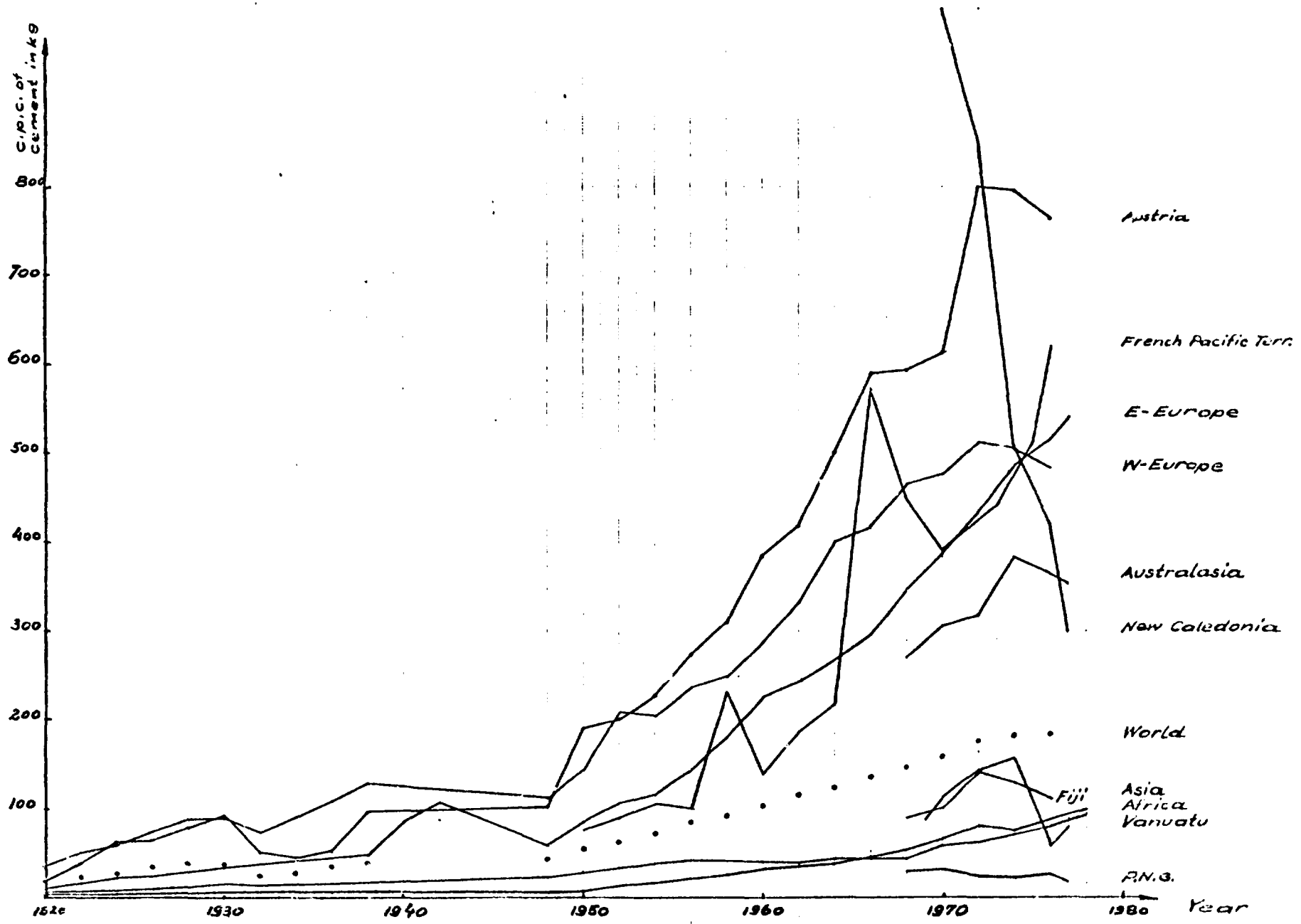


Figure 2: Consumption per capita in time.

TABLE 2: Production and consumption per capita of cement of selected countries and regions

1. Total world

Year	Production in t	Consumption per capita in kg
1913	39 500	24
1920	32 200	19
1921	35 000	20
1922	42 600	24
1923	47 500	27
1924	52 600	29
1925	59 400	32
1926	63 200	34
1927	68 800	37
1928	73 500	39
1929	77 700	40
1930	73 400	38
1931	63 900	32
1932	52 300	26
1933	50 800	25
1934	59 400	29
1935	66 200	32
1936	78 000	37
1937	82 900	39
1938	86 700	40
1947	86 100	39
1948	102 100	45
1949	117 200	50
1950	133 000	55
1951	150 200	60
1952	160 000	63
1953	178 700	68
1954	193 000	73
1955	214 500	81
1956	232 000	86
1957	244 000	87
1958	260 000	92
1959	291 000	98
1960	314 200	104
1961	325 200	110
1962	352 500	116
1963	370 500	116
1964	410 000	124
1965	430 900	131
1966	456 300	137
1967	485 600	140
1968	516 500	147
1969	550 300	152
1970	589 500	158
1971	634 100	164
1972	676 500	176
1973	717 500	188
1974	716 000	182
1975	719 000	180
1976	752 000	184
1977	794 000	189

2. Total Australasia

Year	Production in t	Consumption per capita in kg
1913	300	
<u>1920</u>	480	
1921	480	
1922	525	
1923	625	
1924	690	
<u>1925</u>	750	
1926	800	
1927	890	
1928	920	
1929	900	
<u>1930</u>	725	See
1931	440	Australia
1932	375	and
1933	475	New
1934	590	Zealand
<u>1935</u>	730	
1936	850	
1937	975	
1938	1 075	
1947	1 180	
1948	1 275	
1949	1 330	
<u>1950</u>	1 540	
1951	1 380	
1952	1 610	
1953	1 880	
1954	2 210	
<u>1955</u>	2 400	
1956	2 590	
1957	2 860	
1958	3 030	
1959	3 180	
<u>1960</u>	3 410	
1961	3 510	
1962	3 570	
1963	3 860	
1964	4 450	
<u>1965</u>	4 670	
1966	4 580	
1967	4 700	278
1968	4 750	271
1969	5 150	295
<u>1970</u>	5 500	306
1971	5 550	310
1972	5 900	318
1973	6 450	396
1974	6 450	382
1975	6 200	368
1976	6 200	363
1977	6 050	352

3. Total Western Europe

Year	Production in t	Consumption per capita in kg
1913	17 425	54
<u>1920</u>	10 475	36
1921	13 200	45
1922	15 800	53
1923	16 250	52
1924	19 150	60
<u>1925</u>	22 600	71
1926	23 750	74
1927	26 200	81
1928	28 600	87
1929	32 050	96
<u>1930</u>	29 825	90
1931	26 275	82
1932	23 800	74
1933	25 175	78
1934	29 025	90
<u>1935</u>	32 175	100
1936	35 100	107
1937	37 375	114
1938	41 450	127
1947	28 750	92
1948	36 725	112
1949	43 025	131
<u>1950</u>	49 050	146
1951	54 475	159
1952	58 100	167
1953	64 050	189
1954	68 300	203
<u>1955</u>	76 625	225
1956	79 750	236
1957	81 550	241
1958	83 200	247
1959	93 275	274
<u>1960</u>	99 275	289
1961	107 950	317
1962	114 550	332
1963	118 850	348
1964	136 200	400
<u>1965</u>	139 500	401
1966	145 850	416
1967	147 955	443
1968	156 600	465
1969	165 450	487
<u>1970</u>	180 350	475
1971	187 900	485
1972	200 900	512
1973	209 300	527
1974	204 100	504
1975	195 000	474
1976	200 550 ^b	483
1977	207 200 ^b	485

4. Total Eastern Europe

Year	Production in t	Consumption per capita in kg
1912	1 500	21
	750	10
<u>1920</u>	1 000	14
1921	1 300	16
1922	1 650	22
1923	1 725	23
1924	1 900	25
<u>1925</u>	2 000	25
1926	2 375	29
1927	2 775	34
1928	3 125	39
1929	2 825	35
<u>1930</u>	2 350	29
1931	2 000	25
1932	1 800	22
1933	2 300	28
1934	2 625	31
<u>1935</u>	2 825	33
1936	3 650	43
1937	4 200	48
1938	4 450	45
1947	5 700	61
1948	7 150	76
1949	8 125	86
<u>1950</u>	9 150	98
1951	10 125	107
1952	11 725	121
1953	11 925	117
1954	13 750	125
<u>1955</u>	14 550	142
1956	16 025	162
1957	17 725	180
1958	20 050	201
1959	22 975	230
<u>1960</u>	24 750	240
1961	26 250	243
1962	26 800	244
1963	29 750	268
1964	31 900	277
<u>1965</u>	34 050	296
1966	40 550	321
1967	42 950	346
1968	43 700	357
1969	46 900	386
<u>1970</u>	49 950	413
1971	53 150	434
1972	57 550	465
1973	61 800	487
1974	65 850	498
<u>1975</u>	70 350	517
1976	75 100	541
1977		

5. Total Asia

Year	Production in t	Consumption per capita in kg
1913	1 100	2
<u>1920</u>	2 125	3
1921	2 310	3
1922	2 775	3
1923	3 250	4
1924	3 350	4
<u>1925</u>	3 825	5
1926	4 525	5
1927	5 000	6
1928	5 425	6
1929	5 975	7
<u>1930</u>	5 525	6
1931	5 550	5
1932	5 800	6
1933	6 725	6
1934	7 450	7
<u>1935</u>	9 250	8
1936	9 600	9
1937	10 300	9
1938	10 650	9
1947	5 475	5
1948	6 150	6
1949	9 700	8
<u>1950</u>	11 285	8
1951	15 875	12
1952	17 210	14
1953	26 675	16
1954	24 800	18
<u>1955</u>	25 500	19
1956	31 175	22
1957	35 975	24
1958	40 550	6
1959	48 250	10
<u>1960</u>	53 600	15
1961	53 500	33
1962	58 000	37
1963	67 000	36
1964	73 550	40
<u>1965</u>	81 650	43
1966	91 250	49
1967	93 250	52
1968	109 500	54
1969	134 050	64
<u>1970</u>	132 400	67
1971	143 350	70
1972	168 700	82
1973	180 850	79
1974	173 900	75
1975	185 100	85
1976	197 900	88
1977	217 200	94

6. Total Africa

Year	Production in t	Consumption per capita in kg
1913	100	5
<u>1920</u>	400	6
1921	330	5
1922	360	6
1923	400	7
1924	470	8
<u>1925</u>	460	9
1926	540	10
1927	560	11
1928	590	12
1929	660	15
<u>1930</u>	810	16
1931	875	14
1932	910	14
1933	960	14
1934	1 125	15
<u>1935</u>	1 275	15
1936	1 400	16
1937	1 550	17
1938	1 675	18
1947	2 600	19
1948	2 925	24
1949	3 175	27
<u>1950</u>	4 100	30
1951	4 650	37
1952	4 800	37
1953	5 425	37
1954	6 200	39
<u>1955</u>	7 000	42
<u>1956</u>	7 275	42
1957	7 650	41
1958	8 100	43
1959	8 425	44
<u>1960</u>	8 800	40
1961	8 800	42
1962	8 800	40
1963	9 750	41
1964	10 800	44
<u>1965</u>	11 650	45
1966	12 200	44
1967	12 700	44
1968	14 350	45
1969	16 400	51
<u>1970</u>	18 300	59
1971	19 500	59
1972	20 900	63
1973	22 050	67
1974	23 000	74
<u>1975</u>	23 150	78
1976	23 000	82
1977	24 200	90

7. Austria

Year	Production in t	Consumption per capita in kg
1913	(450)	(50)
<u>1920</u>	120	(19)
1921	230	(36)
1922	270	40
1923	245	49
1924	376	64
1925	424	62
1926	433	65
1927	464	72
1928	523	81
1929	582	89
<u>1930</u>	602	93
1931	502	77
1932	351	53
1933	280	41
1934	315	46
1935	371	54
1936	369	54
1937	429	64
<u>1938</u>	650	96
1947	303	42
1948	721	103
1949	1 098	159
<u>1950</u>	1 289	190
1951	1 475	214
1952	1 389	200
1953	1 392	197
1954	1 615	229
1955	1 854	267
1956	1 930	274
1957	2 129	307
1958	2 174	310
1959	2 417	327
<u>1960</u>	2 828	383
1961	3 100	412
1962	3 142	418
1963	3 311	428
1964	3 809	500
1965	4 053	531
1966	4 499	588
1967	4 548	591
1968	4 552	589
1969	4 579	587
<u>1970</u>	4 961	613
1971	5 602	698
1972	6 371	801
1973	6 006	773
1974	6 307	796
1975	5 507	733
1976	5 758	764
1977	5 904	783

B. Fiji

Year	Production in t	Consumption per capita in kg
1913		
<u>1920</u>		
1921		
1922		
1923		
1924		
1925		
1926		
1927		
1928		
1929		
<u>1930</u>		
1931		
1932		
1933		
1934		
1935		
1936		
1937		
<u>1938</u>		
1947		
1948		
1949		
<u>1950</u>		
1951		
1952		
1953		
1954		
1955		
1956		
1957		
1958		
1959		
<u>1960</u>		
1961		
1962		
1963		
1964		
1965		
1966	(73)	47
1967	89	53
1968	87	55
1969	94	60
<u>1970</u>	102	78
1971	143	91
1972	147	91
1973	129	84
1974	107	72
1975	112	69
1976	(103)	(70)

Until 1966, included in British
Terr. in Australasia

9. French Pacific Territories

Year	Production in t	Consumption per capita in kg
1913		
<u>1920</u>		
1921		
1922		
1923		
1924		
1925		
1926		
1927		
1928		
1929	no figures available	
<u>1930</u>		
1931		
1932		
1933		
1934		
1935		
1936		
1937		
<u>1938</u>		
1947		
1948		
1949		
<u>1950</u>	-	77
1951	-	62
1952	-	89
1953	-	80
1954	-	107
1955	-	71
1956	-	102
1957	-	213
1958	-	229
1959	-	143
<u>1960</u>	-	140
1961	-	191
1962	-	186
1963	-	223
1964	-	220
1965	-	467
1966	-	(573)
1967	-	(494)
1968	-	(448)
1969	-	(419)
<u>1970</u>	-	(386)
1971	-	(428)
1972	-	(436)
1973	-	(440)
1974	-	(500)
1975	-	(510)
1976	-	(620)
1977	-	(620)

10. New Caledonia

Year	Production	Consumption per capita in kg
1913		
<u>1920</u>		
1921		
1922		
1923		
1924		
1925		
1926		
1927		
1928		
1929		
<u>1930</u>		
1931		
1932		
1933		
1934		
1935		
1936		
1937		
<u>1938</u>		
1947		
1948		
1949		
<u>1950</u>		
1951		
1952		
1953		
1954		
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1956		
1957		
1958		
1959		
<u>1960</u>		
1961		
1962		
1963		
1964		
1965		
1966		(446)
1967	-	(290)
1968	-	(581)
1969	-	(1 003)
<u>1970</u>	-	(1 127)
1971		853
1972	42	400
1973	52	507
1974	66	492
1975	58	415
1976	54	300
1977	41	

Until 1966 included
in French Pacific Territories

11. Papua New Guinea

Year	Production in t	Consumption per capita in kg
1913		
<u>1920</u>		
1921		
1922		
1923		
1924		
1925		
1926		
1927		
1928		
1929		
<u>1930</u>		
1931		
1932		
1933		
1934		
1935		
1936		
1937		
<u>1938</u>		
1947		
1948		
1949		
<u>1950</u>		
1951		
1952		
1953		
1954		
1955		
1956		
1957		
1958		
1959		
<u>1960</u>		
1961		
1962		
1963		
1964		
1965		
1966		34
1967	.	29
1968	.	36
1969	.	32
<u>1970</u>	.	42
1971	.	24
1972	.	25
1973	.	25
1974	.	25
1975	.	27
1976	.	(18)
1977	.	

Until 1966, included
in Australian Territories

12. Vanuatu

Year	Production in t	Consumption per capita in kg
1913		
<u>1920</u>		
1921		
1922		
1923		
1924		
1925		
1926		
1927		
1928		
1929		
<u>1930</u>		
1931		
1932		
1933		
1934		
1935		
1936		
1937		
<u>1938</u>		
1947		
1948		
1949		
<u>1950</u>		
1951		
1952		
1953		
1954		
1955		
1956		
1957		
1958		
1959		
<u>1960</u>		
1961		
1962		
1963		
1964		
1965		
1966		
1967	-	
1968	-	
1969	-	88
<u>1970</u>	-	114
1971	-	139
1972	-	145
1973	-	167
1974	-	156
1975	-	56
1976	-	(60)
1977	-	(80)

Until 1966 included
in French Pacific Territories

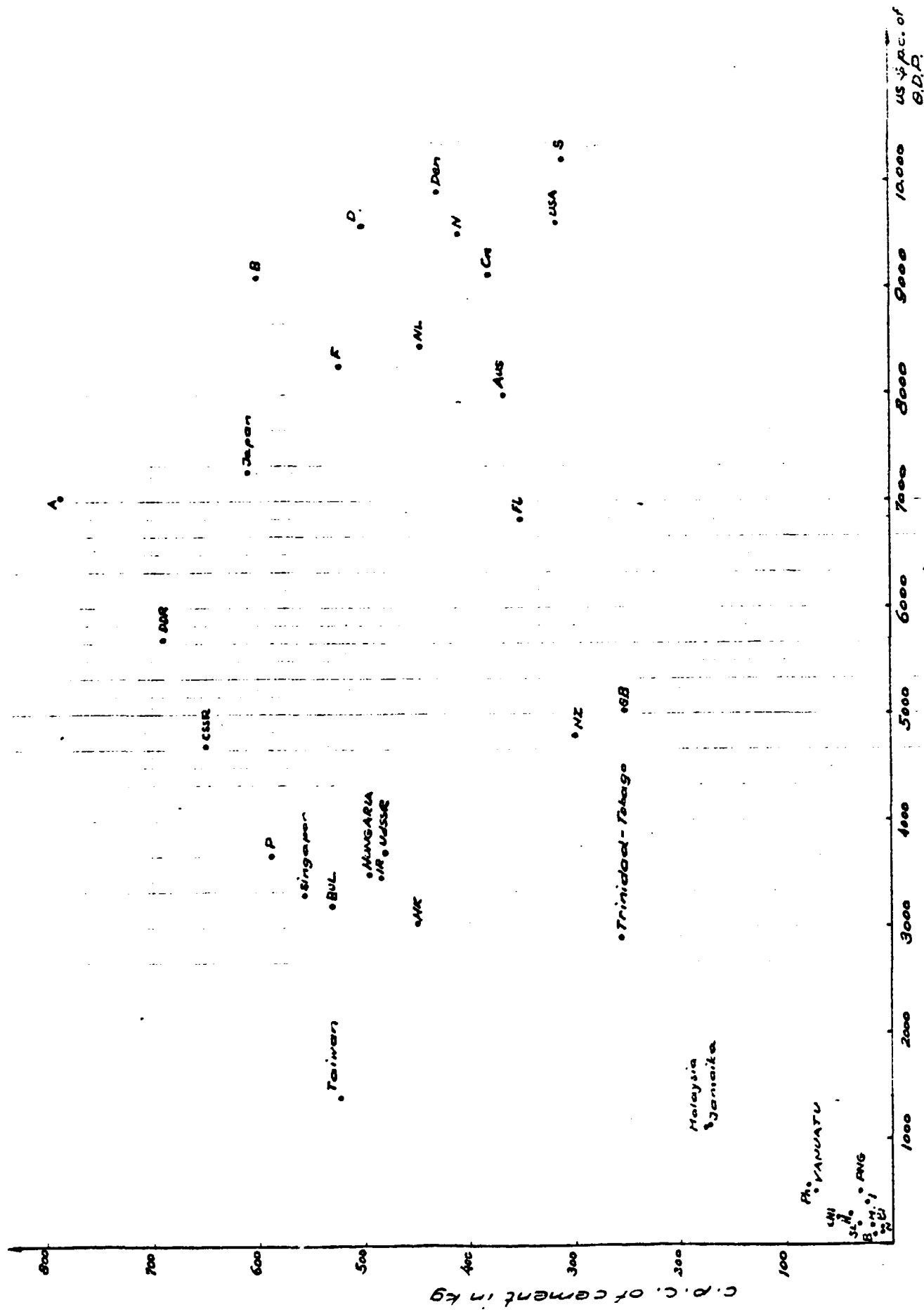


Fig. 3: Consumption of cement and G.D.P. per capita

3. MARKET AREA AND MARKET POTENTIAL

3.1. Geographic segmentation of the potential market

The potential cement market for Vanuatu may be determined by a number of factors on which we have to make assumptions. It is assumed that

- the cement market is open for newcomers;
- there is a cost oriented price competition (no dumping);
- transport costs depend mainly on distance;
- the quality of cement planned to be produced in Vanuatu will be equal to the quality of cement of other competitors or higher;
- the Vanuatu cement industry will be competitive as far as technology, cost structure, management and other prerequisites of a sound industry are concerned;

Furthermore, the competitors are located in New Zealand, Australia (except Darwin), Singapore (clinker mills only), Taiwan, Japan, Korea and U.S.A.

The above assumptions and facts lead to the geographic segmentation of the potential cement market as shown in figure 4: we may distinguish 3 segments:

- a) The first segment or inner segment: it comprises the local market of Vanuatu, New Caledonia and the Solomon Islands.
- b) The second segment: it comprises P.N.G., most of the South Pacific Islands and the Northern Territory of Australia with Darwin as consumption centre.
- c) The third segment or peripheral segment: it comprises Singapore and other places, where occasional sales are possible.

3.2. Description of the present situation in some parts of the segments

- a) The inner segment:

The local market of Vanuatu

Cement is imported from various countries: New Zealand, Australia, France, etc.

Table 3: POPULATION, GDP p.c. and CONSUMPTION OF CEMENT p.c.

Country	Population in 1978 (in mio)	GDP p.c. in US\$ 1978	Consumption of cement p.c. in kg
Cambodia	8,4	-	3
Bangladesh	84,7	90	4
Laos	3,3	90	
Bhutan	1,2	100	15
Ethiopia	31,0	120	4
Mali	6,3	120	12
Nepal	13,0	120	8
Somalia	3,7	130	15
Burundi	4,5	140	6
Chad	4,3	140	4
Mozambique	9,9	140	-15
Burma	32,2	150	7
Uppervolta	5,6	160	12
Vietnam	51,7	170	30
India	643,9	180	29
Malawi	5,7	180	17
Ruanda	4,5	180	6
Sri Lanka	14,3	190	30
Guinea	5,1	210	20
Sierra Leone	3,3	210	30
Zaire	26,8	210	25
Niger	5,0	220	12
Benin	3,3	230	40
Pakistan	77,3	230	44
Tanzania	16,9	230	34
Afghanistan	14,6	240	11
Central African Republic	1,9	250	10
Madagascar	8,3	250	25
Haiti	4,8	260	38
Mauritania	1,5	270	45
Lesotho	1,3	280	-
Uganda	12,4	280	22
Angola	6,7	300	18
Sudan	17,4	320	25
Togo	2,4	320	92
Kenia	14,7	330	39
Senegal	5,4	340	62
Indonesia	136,0	360	22
Egypt	39,9	390	99
Ghana	11,0	390	66
Yemen	1,8	420	17(400)
Cameroon	8,1	460	58
Liberia	1,7	460	98
Honduras	3,4	480	86
Zambia	5,3	480	82
Zimbabwe	6,9	480	90
Thailand	44,5	490	98
Bolivia	5,2	510	42

Country	Population in 1978 (in mio)	GDP p.c. in US\$ 1978	Consumption of cement p.c.in kg
Philippines	45,6	510	85
Yemen, Arab.Rep.	5,6	520	- (13)
Congo	1,5	540	64
Nigeria	80,6	560	97
Papua New Guinea	2,9	560	27
El Salvador	4,3	650	82
Morocco	18,2	670	187
Peru	16,8	740	125
Ivory Coast	7,2	840	177
Nicaragua	2,5	840	100
Colombia	25,6	850	120
Paraguay	2,9	850	71
Ecuador	7,8	850	170
Dominican Rep.	5,1	910	174
Guatemala	6,6	910	103
Suria, Arab.Rep.	8,1	930	300
Tunisia	6,0	950	270
Jordan	3,0	1.050	328
Malaysia	13,3	1.090	160
Jamaica	2,1	1.110	190
Lebanon	3,0	-	450
Rep. of Korea	36,6	1.160	450
Turkey	43,1	1.200	300
Algeria	17,6	1.260	217
Mexico	65,4	1.290	186
Panama	1,8	1.290	250
Taiwan	17,1	1.400	523
Chile	10,7	1.410	150
South Africa	27,7	1.480	280
Costa Rica	2,1	1.540	191
Brazil	119,5	1.570	189
Uruguay	2,9	1.610	177
Argentina	26,4	1.910	237
Portugal	9,8	1.990	470
Yugoslavia	22,0	2.380	385
Trinidad and Tobago	1,1	2.910	256
Venezuela	14,6	2.910	338
Hong Kong	4,6	3.040	445
Greece	9,4	3.250	635
Singapore	2,3	3.290	600
Spain	37,1	3.470	597
Israel	3,7	3.500	524
Ireland	3,0	3.470	485
Italy	56,7	3.850	669
New Zealand	3,2	4.790	293
Great Britain	55,8	5.030	259
Finland	4,8	6.820	353
Austria	7,5	7.020	783
Japan	114,9	7.280	608
Australia	14,2	7.990	362
France	52,3	8.260	523
Netherlands	13,9	8.410	441

Country	Population in 1978 (in mio)	GDP p.c. in US\$ 1978	Consumption of cement p.c.in kg
Belgium	9,8	9.090	608
Canada	23,5	9.180	380
Norway	4,1	9.510	410
W.Germany	61,3	9.580	505
USA	221,9	9.590	319
Denmark	5,1	9.920	427
Sweden	8,3	10.210	308
Switzerland	6,3	12.100	584
Iraq	12,2	1.860	282
Iran	35,8	2.160	263
Libya	2,7	6.910	900 ⁺
Saudi Arabia	8,2	7.690	780 ⁻
Kuwait	1,2	14.890	700
People's Rep. of China	952,2	230	58 ⁻
Dem. People's Rep. of Korea	17,1	730	420
Albania	2,6	740	263
Cuba	9,7	810	287
Mongolia	1,6	940	111
Rumania	21,9	1.750	497
Bulgaria	8,8	3.230	534
Hungary	10,7	3.450	484
Poland	35,0	3.670	590
USSR	261,0	3.700	480
Czechoslovakia	15,1	4.720	653
German Dem. Rep.	16,7	5.710	692

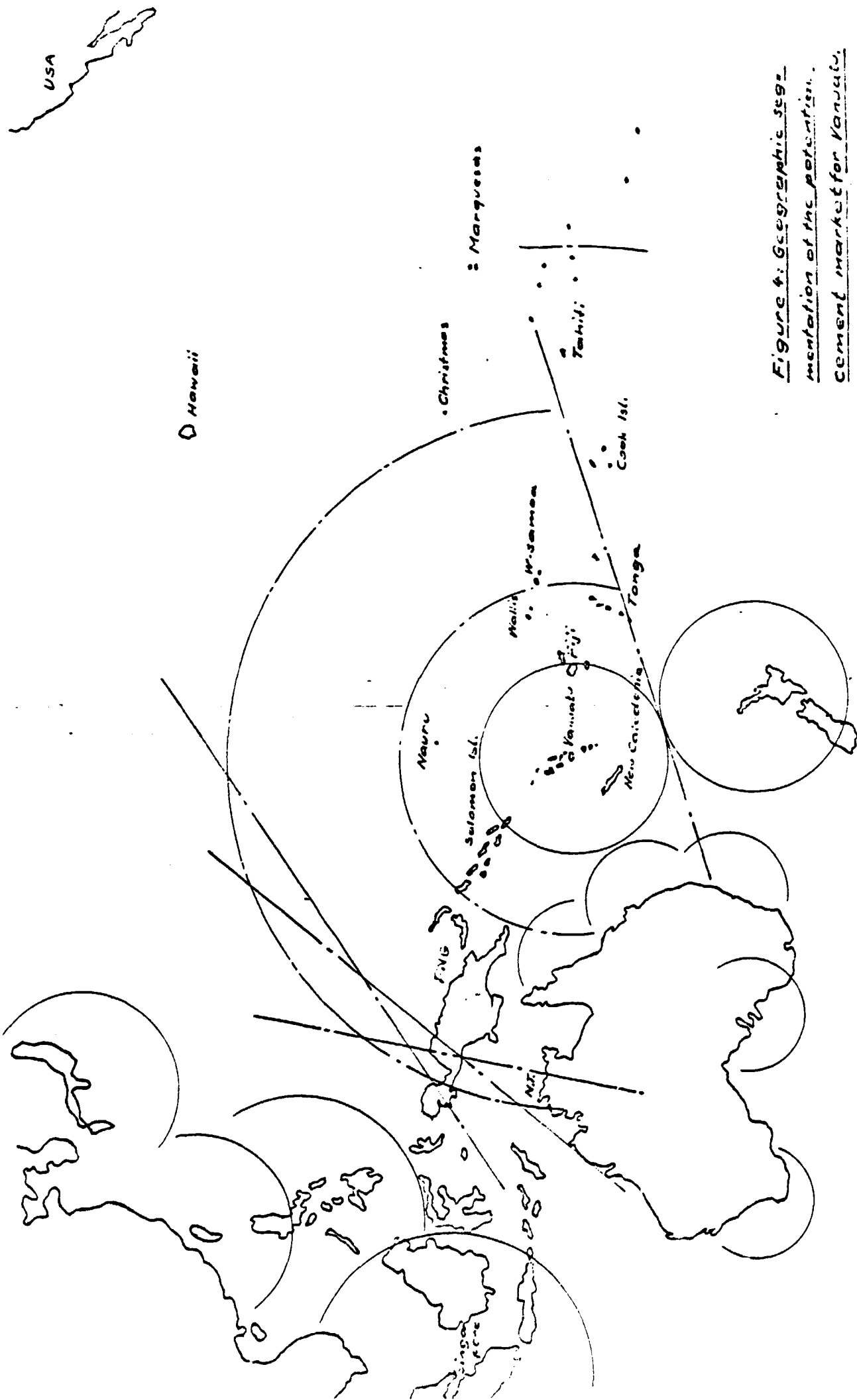


Figure 4: Geographic segmentation of the potential cement market for Vanuatu.

Pozzolana is made locally for very limited use in villages. During the last 15 years imports fluctuated between 5.000 t and 15.000 t per year.

The consumption p.c. fluctuated between 56 kg and 167 kg p.c., there is no continuous development of cement consumption. The reasons are evident: the consumption of the local population is very low, perhaps 20 - 25 kg p.c. The difference is used for large projects or/and expatriates. This component is fluctuating as long as it is not part of a development programme or for political reasons: departure of many expatriates before and after independence, but it may change very soon.

Cement prices are more or less prohibitive for the local population.

New Caledonia

The cement consumption p.c. is very high. During the last 15 years it fluctuated between 290 and 1.127 kg. There are clinker mills using imported clinker. Part of the cement is imported in bags.

The total consumption fluctuated during the last 15 years between 29.000 and 125.000 t/year.

The Solomon Islands

The Solomon Islands have a population of 230.873 people (1980) of which 18.500 are living in Honiara.

The total quantity of cement consumed in the country is imported. The main importers - private firms - are: Bowman - Honiara, Concrete Industries - Honiara, Atasi - Honiara;

Quantities and values of cement imports from 1975 - 1980 are shown in table 4.

Table 4 Cement imports of the Solomon Islands

Year	1975	1976	1977	1978	1979	1980
Imports in 1.000 t	8	5	3	6	8,3	7,3
Imports in 1.000 SI-\$	255	133	102	297	510	392
Average CIF prices						
in US-\$	35,2	30,2	41,9	51,4	69,9	61,4
in IS-\$	31	26,6	36,9	45,2	61,5	54

In 1980 cement was imported from the following countries:

New Zealand	50 %
Australia	30 %
Japan	20 %

Japan has been loosing ground because of more regular supply and better conditions from New Zealand. The wholesale price was 81,7 US\$/t in 1980. The corresponding retail price was 6,25 US\$ to 7,95 US\$ per bag of 50 kg or 125 to 159,- US\$/t. The consumption per capita was in 1980 31,5 kg.

There is some evidence that consumption of cement will increase in the near future owing to the forthcoming implementation of important projects like the Lunga Hydro Project and a housing programme; but no figures are available.

b) The second segment: P.N.G.

Papua New Guinea has a population of 3,020.000 people. Besides Pt. Moresby we may distinguish four consumption centres: Kieta, Lae, Mt. Hagen and Madang.

At present cement is imported in bags. The main importers are:

1) Monier (PNGP Limited

POE 328 - Pt. Moresby

Tel. 25 33 44 (attention: M. Henson)

Monier has subsidiaries at Kieta, Lae and Mt. Hagen and imports about 8.000 t/year

- 2) PNG Ready mixed concrete Pty. Ltd.
(attention: Mike Sax)
Pt. Moresby, Frangipani Street, Hohola
The company has a subsidiary at Lae and imports about 8.000 t/year

Other importers and/or distributors are:

- 3) Kubor Earthmoving (PNG) Pty. Ltd.
POB 492, Mt. Hagen
- 4) Transitmix
Waigani Drive, Gordons Estate
Pt. Moresby, POB 1396, Boroko, PNG
- 5) Barlow Industries Pty. Ltd.
POB 163
Pt. Moresby
- 6) Bowmans
POB 1888 Boroko, PNG
- 7) Carpenters New Guinea Co. Ltd.
POB 6571, Borko
The company has subsidiaries at Lae, Madang and Mt. Hagen.
- 8) Saraga Masonry and Block Co.Pty.Ltd.
POB 1487, Boroko

The following table 5 shows the development of cement imports of PNG. Statistics from a different source are shown as appendix I for 1981. The consumption per capita is again very low: about 18 kg in 1980 compared with 30 - 42 kg in previous years.

As far as the countries of origin of cement (table 6) are concerned, we find an interesting development, which confirms our observations made in the Solomon Islands: the market share of Japan has been decreasing considerably while New Zealand has succeeded in increasing its market share from 0 in 1977 to 50 % in 1980. It is also interesting to note that USA entered the market in 1981 too.

Table 5 : Cement imports and consumption per capita of PNG

Year	Imports in 1.000 t = consumption	consumption p.c.
1967	76	34
1968	66	29
1969	84	36
1970	77	32
1971	103	42
1972	61	24
1973	65	25
1974	66	25
1975	70	25
1976	75	27
1977	49	18
1978	41	13,6
1979	57*	19
1980	53*	18
1981	43*	

* Estimates based on actual figures for 9 months.

Table 6 : Origin of imported cement

Country of origin	Imports in 1.000 t				
	1977	1978	1979*	1980*	1981*
Australia	7,9	4,5	9,7	4,9	3,8
Japan	40,9	35,7	24,1	14,7	17,1
UK	0,05	-	-	-	-
Singapore	0,1	0,4	1,7	0,6	0,5
New Zealand	-	0,03	8,2	20,5	9,6
USA	-	-	-	-	0,5

*covers 9 months only

In 1981 the price per ton for gray portland cement in bags of 50 kg shows the following structure:

	K	US\$
FOB Pt. Moresby	62,-	91,20
Wharfage	14,6	
Landed	76,6	112,6
Import Duty 2,5 %		
<u>Retail price</u>	<u>110,-</u>	<u>161,8</u>
Price of 1 bag of 50 kg	5,50	8,10

The Northern Territory of Australia

The Northern Territory of Australia has no lime-stone and consequently no cement works.

Cement is imported from Japan, Thailand, Korea, the Philippines and Singapore.

Total imports amount at present to about 60.000 t per year.

In the near future - probably from July 1981 - imports will be reduced to 30.000 t per year and 30.000 t will be purchased from Perth. According to M. Tom Rudd, manager of Northern Cement, the freight rate Perth - Darwin is 75 - 90 AUS \$/ton (for 3.000 miles). In order to overcome the problem of high transport costs the Government will subsidise cement from Perth.

At present grey portland cement costs US\$ 95,- per ton C.F. Darwin. The sole distributor of cement is Northern Cement Pty. Limited
POB 2399
Darwin, N.T. 5794 Tel.: 81 67 91 Telex: AA 85 047
The managing director is M. Trippe holding 10 % shares. Other shareholders are:

Adelheid Brighton Cement with 40 % and
Burns Philp with 50 %

Northern Cement sells grey portland cement in bulk at a price of 109 AUS \$ ex work, equal to about 124 US\$ or in bags at 116,50 AUS \$, equal to 132 US\$.

For comparison: at Townsville - Queensland cement in bulk is sold at 65 AUS \$/t ex work, equal to 73,9 US\$.

Northern Cement would be interested to buy 40.000 to 120.000 t/year quick lime in shipments of 25.000 t.

c) The peripheral segment

Singapore

The country has a population of 2,413.900 people, with an employment of 1,050.000 persons and a GDP per capita of 8.587 S\$ or about 4.200 US\$. The consumption of cement per capita is very high, i.e. 663 kg.

There are five clinker grinding mills in Singapore, who import clinker mainly from Japan, Korea and Taiwan. The suppliers of clinker are in most cases holding shares of the grinding plants and have firm supply contracts. One or two clinker grinding companies, however, would be prepared to purchase clinker from an other source, if conditions and price were favourable. Table 7 shows available figures on foreign trade in quicklime and cement of various kinds for 1980.

Table 7 : Imports and Exports of quicklime and cement of Singapore in 1980

	Exports (FOB)	Imports (CIF)
Quicklime t	94	11.691
1000 S\$	36	865
Price in S\$	383 (?)	74
Slaked Lime t	4.716	3.952
1000 S\$	907	708
Price in S\$	192	179
Hydraulic lime T	1.647	810
1000 S\$	187	645
Price in S\$	114	796 (?)
Portland Cement t	412.694	35.488
1000 S\$	53.847	4.652
Price in S\$	130	131
Cement clinker t	2.274	1,746.388
1000 s\$	233	183.607
Price in S\$	102	105
Whit Cement t	2.227	8.060
1000 S\$	874	2.616
Price in S\$	392	324
Other Cement t		41.060
1000 S\$		9.218
Price in S\$		225

The five finish grinding plants are:

- 1) Asia Cement (S) Pte. Ltd.
Room 504/506 Chinese Chamber of Commerce Bldg
47 Hill Street, Singapore 0617, Telephone: 336 3233
Mr. Kou Ming Yang, Deputy Managing Director
- 2) Turong Cement Ltd.
15 Pioneer Crescent, Telephone: 26 18 016 or 2618 018
Mr. Tan Eng Sim, Managing Director
- 3) Singapore Cement Mfg.Co. (Pte) Ltd.
24th Floor, Hong Leong Building
16 Raffles Quay, Telephone: 22 08 410 or 2208 419
Mr. George Teo, General Manager/Director
- 4) Ssangyong Cement (S) Pte. Ltd.
17 Pioneer Crescent, Telephone: 26 54 588
1. Mr. Tan Cheng Gay
2. Mr. Lee Yoo In
- 5) Pan Malaysia Cement Work (S) Pte. Ltd.
17 Tanjong Kling Road
Turong Town, Telephone: 26 50 333
Mr. Saw Ewe Seng

The main retailers are:

- 1) Associated Cement Distributors Pte. Ltd.
903 Thong Cah Bldg., Tel.: 98 11 33
- 2) Hup Lee Cement co.
11 Jin Simpah 11 ms or 51 Ulu Bedok
- 3) Suppiah S. Co.
Meyappa Chettiar Rd.
- 4) Nan Tat Cement Products Co.
48-L Lor Lintang
- 5) Ming Hup Cement Co.
306 Braddell Rd.

The following table 8 shows figures on the development and other aspects of the Singapore cement industry. There has been a continuous increase in output since 1970. The value added per worker has been increasing too for the whole periode, but the value added as percentage of the output has been fluctuating between 18 and 30 %, mainly owing to price fluctuations. Exports amount to roughly 30 % of total sales.

For any additional inquiry the following officer with the Singapore Economic Development Board may be contacted:

NG Seh Ming
Industry officer - non metallic minerals
9th floor, World Trade Centre
1 Maritime Square, Telok Blangah Road
Singapore 0409

In Singapore prices are considerably lower than in the South Pacific. Grey Portland cement costs 65 US\$/t FOB Singapore, clinker costs 50 US\$ and quicklime 74 US\$/t.

3.3. The market potential

The market potential is a concept employed to determine the size of the market if the marketing effort is at a maximum for a given marketing environment. It can be estimated by using direct data and corollary data.

The corollary data method is based on the relationship between the population (quantity) and the average consumption of cement per capita at a given gross domestic product per capita. Direct data are limited - at this stage of the market study - to estimates of the autonomous demand of cement for investment programmes not related to GDP.

The market potential of the total market area is estimated by simply aggregating estimates of the particular countries.

The projections of the market potentials are based on assumptions on combined rates of growth including growth of population and GDP.

Market potential and projections are shown in table 9 below:

Table 9: Market potential and projections

Market area	Population	Potential consumption of cement (estimate)	Growth rate (estimate)	Projected market potential in 1000 t			
				1983	1985	1990	1995
a) The inner segment							
Vanuatu	112,000	400	3	44,8	47.8	55,1	64.-
New Caledonia	160,000	375	3	60.-	63.7	73.9	85.6
Solomon Islands	230,900	200	3	46.-	48.8	56.6	65.6
				150,8	160,3	185,6	214,2
b) The second segment							
Papua New Guinea	3,020,000	200	3	604.-	640,8	742.9	861.2
Northern Territory of Australia	3	65.-	69.-	80.-	92.7
French Territories	120,000	400	3	48.-	51.-	59.1	68.5
British Territories	200,000	100	3	20.-	21.2	24.6	28.5
				737.-	782.-	906.6	1050.9
c) The peripheral segment							
Singapore	2,414,000	660	3	1,600.-	1,697.-	1,967.-	2,280.-

1
2
1

3.4. Actual total sales and sales projections

Figures on total sales of cement in the market area are available but the time series seem not to be long enough to make extrapolations of the market trend. Most fluctuations in the past are not cyclical but mainly irregular variations. Therefore it is simply proposed to base projections on total sales in 1980 and to make assumptions on growth rates for cement consumption, using comparable rates from other countries and estimates of the economic development of each country concerned.

Table 10 shows the actual total sales in the market area by country and segment as well as sales projections for 1983 to 1995.

Table 10: Total sales of cement

Market area	Effective sales in 1000 t in 1980	Sales per capita in kg	Growth rate for future sales	Projected sales in 1000 t			
				1983	1985	1990	1995
a) The inner segment							
Vanuatu	8	70	10	10.6	13.-	20.8	33.4
New Caledonia	60	375	3	65.6	69.6	80.0	93.5
Solomon Islands	7.3	32	12	10.3	12.9	22.7	40.0
	75.3	477	..	86.5	95.5	123.5	166.9
b) The second segment							
Papua New Guinea	53	18	12	75	93.7	164.8	290
Northern Terr.of Australia	60	..	10	80	97.5	156	250
French Territory	76	620	0	76	76	76	76
British Territory	6	30	10	8	9.8	15.6	25
	189	239	77	412.4	641
c) The peripheral segment							
Singapore	1,600	663	3	1600	1697	1967	2280

4. Market share, plant capacity and marketing strategy

The market is the main factor limiting the plant capacity of a future cement factory in Vanuatu. Taking into account the economies of scale and other factors favouring a large capacity, the objective of the market study must be to determine the largest possible market share.

The following assumptions are made to quantify the market share:

1. Vanuatu: The market share will increase from 0 to 100% of the projected sales within 6 months of operations of the factory.
2. New Caledonia and Solomon Islands: The market share will increase from 0 to 40% of the projected rates within 6 months and to 80% within another year.
3. The second segment: The market share will increase to 20% within 6 months and to 40% within another year.
4. The peripheral segment: The market share will increase to 10% within 1 year.

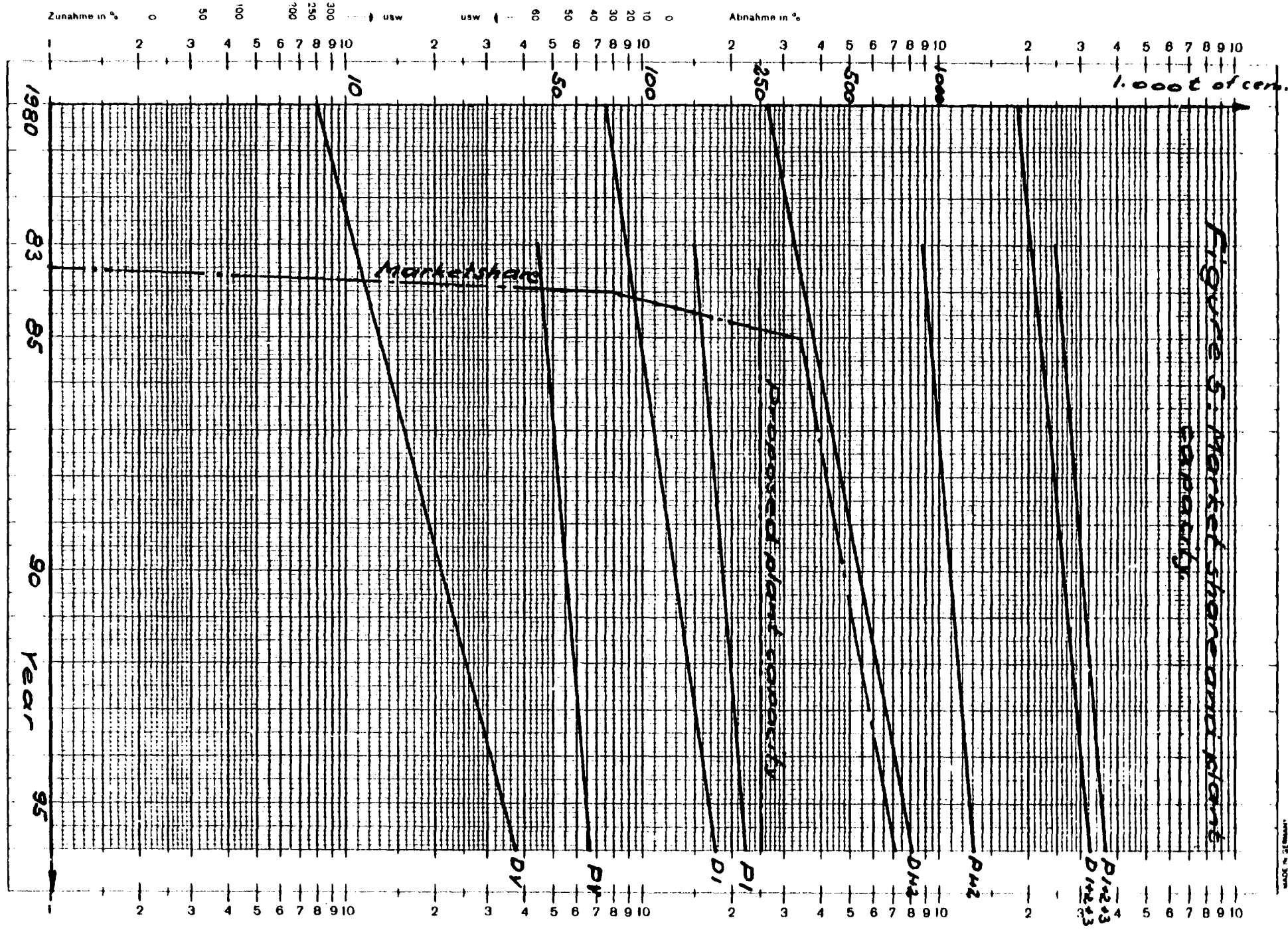


Figure 5: Market share and plant capacity

Zunahme in % 0 50 100 200 300 usw. usw. Abnahme in % 2 3 4 5 6 7 8 9 10 2 3 4 5 6 7 8 9 10 2 3 4 5 6 7 8 9 10

Figure 5 shows: the market potential of Vanuatu (PV), the inner segment (P1), the sum of inner and second segment (P 1+2) and the total "envisaged" market area (P 1+2+3);

- . the total sales or effective demand for Vanuatu (DV), the inner segment (D1) etc.;
- . the expected market share of the Vanuatu cement industry corresponding to the above assumptions;
- . the proposed plant capacity.

The above assumptions and the choice of the plant capacity imply a certain marketing strategy. The main objective of the marketing strategy is to guarantee a market large enough to absorb more or less the normal production of the factory. To succeed in doing so, it must be envisaged to build clinker mills in the most important consumption centres. They may be joint ventures with private entrepreneurs of those countries or their governments.

5. Summary and recommendations

5.1. Summary

- a) This report presents the findings of a market study made in the Solomon Islands, Papua New Guinea, the Northern Territory of Australia and Singapore from June 17 to June 29, 1981.
- b) Most of the data and information used in the analysis have been collected directly from cement dealers and Government services of the four countries and may be considered as reliable.
- c) The present report covers only a part of the necessary market study, i.e. mainly facts and arguments to determine size and composition of the present effective

market demand, to determine market area, market potential, market share and finally the plant capacity for the project as far as this can be done without knowing the results of the technical feasibility study and of the financial evaluation.

The final plant capacity, the sales plan with estimates of sales revenues, sales and distribution costs, the marketing plan including the promotion and advertising plan, and the production programme can be dealt with only after the necessary feedbacks from the technical feasibility study and a first financial evaluation.

d) At this stage the findings of the study may be summarized as follows:

- . Market area: Taking into account the location of the existing production centres of cement or clinker and quick-lime the following countries may be considered as potential market area for a cement works in Vanuatu:

Vanuatu,

Solomon Islands

Papua New Guinea

Northern Territory of Australia, French Territories
in the South Pacific

British Territories in the South Pacific

and to some extent Singapore and other countries
in the region.

- . Products to be manufactured:

There is a market for grey portland cement, special kinds of cement, clinker and quick-lime.

At this stage it can be said that the main products should be grey portland cement and clinker.

. Plant capacity:

At this stage of the study a plant capacity of 250.000 t of clinker per year seems to be most suitable. At least 100.000 t of the clinker should be transformed into grey portland cement in bags or in bulk and the rest should be delivered to clinker mills. But this issue needs further considerations.

. Clinker mills in consumption centres: A very powerful instrument to capture the market of cement would be to establish clinker mills in important consumption centres in the form of joint ventures with the governments.

. Sea transport: The regular supply of cement is a prerequisite to capture and keep the market. Regular and reliable transport of coal is an other prerequisite for success.

. The marketing policy may include measures to develop forward linkages, i.e. concrete industries.

. Time is an important factor. The actual advantages could get lost if the development of the project takes too much time, say more than three years.

5.2. Recommendations:

- a) It is recommended to start as soon as possible
 - the technical feasibility study and
 - the economic analysis and evaluation of the projectas mentioned in the Memo of the Ministry of Finance dated 22 May 1981 (Appendix 2).
- b) It is recommended that UNIDO recruits as soon as possible
 - one cement engineer and
 - one industrial economistaccording to appendices 2 and 3. It may be necessary to recruit additionally
 - one civil engineer.
- c) It is recommended that the recruitment of the experts is scheduled in such a way that they can work together whenever necessary and elaborate a homogenous feasibility study.
- d) It is recommended to provide for a duration of one month for each expert with possibility of extension in order to guarantee that the study can be brought to an end.
- e) It is recommended that both the Government of Vanuatu and UNIDO take steps to secure funds for further assistance to develop the project, if required and if the feasibility study comes to a positive result.

APPENDIX 1: Imports of Cement and Similar Products of PNG 1981

January

Lime, Cement and Fabricated Building Materials, Except
Glass and Clay Materials

<u>COUNTRY</u>	<u>VALUE (K)</u>
- AUST -	570.95
- JAP -	94,622.24
- NZ -	258.06
ALL	95,452.05

Grey Portland Cement

<u>COUNTRY</u>	<u>VALUE (K)</u>
JAP	120,835.15
NZ	40,321.18
- SING -	11,669.51
ALL	222,825.84

Other Cement Fondu, Slac Cement, Hydraulic Cement

<u>COUNTRY</u>	<u>VALUE (K)</u>
- AUST -	186.15

February

Lime, Cement and Fabricated Building Materials, Except
Glass and Clay Materials

<u>COUNTRY</u>	<u>VALUE (K)</u>
- CAN -	9,177.06

Grey Portland Cement

<u>COUNTRY</u>	<u>VALUE (K)</u>
AUST	3,071.29
JAP	40,042.58
NZ	24,642.72
ALL	67,986.59

Other Cement Fondu, Slag Cement, Hydraulic Cement

<u>COUNTRY</u>	<u>VALUE (K)</u>
AUST	83.07

March

Lime, Cement and Fabricated Building Materials, Except
Glass and Clay Materials

<u>COUNTRY</u>	<u>VALUE (K)</u>
JAP	104,519.90

Grey Portland Cement

<u>COUNTRY</u>	<u>VALUE (K)</u>
AUST	80,356.08
JAP	34,935.41
NZ	93,534.13
USA	22,360.12
ALL	231,186.34

Other Cement Fondu, Slag Cement, Hydraulic Cement

<u>COUNTRY</u>	<u>VALUE (K)</u>
AUST	3,241.28

April

Lime, Cement and Fabricated Building Materials, Except
Glass and Clay Materials

<u>COUNTRY</u>	<u>VALUE (K)</u>
AUST	265.61
JAP	47.09
ALL	312.70

Grey Portland Cement

<u>COUNTRY</u>	<u>VALUE (K)</u>
AUST	1,570.97
JAP	110,666.68
NZ	27,769.00
ALL	140,006.65

White or Coloured Portland Cement

<u>COUNTRY</u>	<u>VALUE (K)</u>
JAP	10,036.50
SING	11,393.41
ALL	21,429.91

Other Cement Fondu, Slag Cement, Hydraulic Cement

<u>COUNTRY</u>	<u>VALUE (K)</u>
AUST	11,077.85
UK	1,656.13
ALL	12,733.98

May

Grey Portland Cement

<u>COUNTRY</u>	<u>VALUE (K)</u>
AUST	76,308.17
JAP	39,874.28
NZ	63,851.79
SLAG	9,220.66
ALL	183,254.90

White or Coloured Portland Cement

<u>COUNTRY</u>	<u>VALUE (K)</u>
AUST	7,614.34
JAP	3,478.84
ALL	11,093.18

Other Cement Fondu, Slag Cement, Hydraulic Cement

<u>COUNTRY</u>	<u>VALUE (K)</u>
AUST	84.08

June

Lime, Cement and Fabricated Building Materials, Except
Glass and Clay Materials

<u>COUNTRY</u>	<u>VALUE (K)</u>
AUST	276.09

Grey Portland Cement

<u>COUNTRY</u>	<u>VALUE (K)</u>
AUST	1,172.91
JAP	41,549.87
NZ	17,020.72
ALL	59,743.50

White Or Coloured Portland Cement

<u>COUNTRY</u>	<u>VALUE (K)</u>
JAP	2,623.52

Other Cement Fondu, Slag Cement, Hydraulic Cement

<u>COUNTRY</u>	<u>VALUE (K)</u>
AUST	328.93

JULY

Lime, Cement and Fabricated Building Materials, Except
Glass and Clay Materials

<u>COUNTRY</u>	<u>VALUE (K)</u>
AUST	615.25
JAP	322,087.96
UK	1,044.96
ALL	323,748.15

Grey Portland Cement

<u>COUNTRY</u>	<u>VALUE (K)</u>
AUST	71,882.34
JAP	60,188.15
NZ	92,027.31
SING	7,483.65
ALL	232,181.45

White or Coloured Portland Cement

<u>COUNTRY</u>	<u>VALUE (K)</u>
AUST	2,789.71
NZ	55,579.50
ALL	58,369.21

Other Cement Fondu, Slag Cement, Hydraulic Cement

<u>COUNTRY</u>	<u>VALUE (K)</u>
AUST	120.37

AUGUST

Lime, Cement and Fabricated Building Materials, Except Clay
and Glass Materials

<u>COUNTRY</u>	<u>VALUE(K)</u>
- AUST -	253.96
- NZ -	180.66
- **ALL**	434.62

Grey Portland Cement

<u>COUNTRY</u>	<u>VALUE(K)</u>
- AUST -	4,629.08
- JAP -	44,775.63
- NZ -	70,925.93
- SING -	2,928.57
- USA -	11,269.50
- **ALL**	140,528.91

White or Coloured Portland Cement

<u>COUNTRY</u>	<u>VALUE(K)</u>
- AUST -	662.00
- JAP -	2,346.58
- NZ -	3,065.43
- **ALL**	6,074.01

SEPTEMBER

Lime, Cement and Fabricated Building Materials, Except Glass
and Clay Materials

<u>COUNTRY</u>	<u>VALUE(K)</u>
- AUST -	424.82
- NZ -	476.13
- **ALL**	900.95

Grey Portland Cement

<u>COUNTRY</u>	<u>VALUE(K)</u>
- AUST -	1,385.79
- JAP -	48,454.97
- NZ -	107,181.31
- **ALL**	157,022.07

White or Coloured Portland Cement

<u>COUNTRY</u>	<u>VALUE(K)</u>
- JAP -	752.15
- NZ -	3,053.14
- **ALL**	3,805.29

Other Cement Fondu, Slag Cement, Hydraulic Cement

<u>COUNTRY</u>	<u>VALUE(K)</u>
- AUST -	11.55
- JAP -	20,662.13
- NZ -	6,137.93
- **ALL**	26,811.61

JAN - SEPTEMBER 1981

Lime, Cement and Fabricated Building Materials, Except Glass
and Clay Materials

<u>COUNTRY</u>	<u>VALUE (K)</u>
AUST	2,406.64
CAN	9,177.06
JAP	521,277.19
NZ	415.65
UK	1,044.96
ALL	534,821.50

Grey Portland Cement

<u>COUNTRY</u>	<u>VALUE (K)</u>
AUST	234,377.23
JAP	541,362.40
NZ	594,064.09
SING	51,302.59
USA	33,624.62
ALL	1,434,736.23

White or Coloured Portland Cement

<u>COUNTRY</u>	<u>VALUE (K)</u>
AUST	11,066.05
JAP	22,440.71
NZ	40,672.84
SING	11,343.41
ALL	136,073.01

Other Cement Fondu, Slag Cement, Hydraulic Cement

<u>COUNTRY</u>	<u>VALUE (K)</u>
AUST	15,133.26
JAP	20,662.13
NZ	6,137.93
UK	1,636.13
ALL	43,569.45

22nd May

D.D.E.

MINISTER OF FINANCE

DEVELOPMENT OF CEMENT - PROJECT

1. Importance of the Project

- a) In realizing the cement project a very high investment, (exceeding 30 to 50 million \$) will be necessary. This important investment will have great impact and considerable effect on the economy of Vanuatu.
- b) The realization of the project is of strategic importance because a cheap building material for the entire construction sector, including infrastructure (ports, wharfs, etc.) will be available all over the archipelago of Vanuatu. This means a strong multiplier effect of economic development on all islands. The local price of cement could be half to one fourth of the actual price.
- c) The high share of exports will necessitate regular and frequent communications with the neighbouring countries which will stimulate the whole sector of transports and communications in a very positive way. The development of the transport and communications sector will again incite an expansion of many other economic activities.
- d) The realization of the project has considerable income and employment effects. Depending on the conception of the factory 200 to 400 employments will be created.
- e) The high share of exports in the total production involves an important inflow of foreign exchange and that means a substantial balance of payments effect could be achieved.
- f) The stimulation of other economic activities through the realization of the cement - project will cause a general growth and prosperity effect. The direct and indirect effects and the high incomes of this industry will increase the level of the well being of the people of Vanuatu.

Complicated and comprehensive contracts have to be agreed upon determining the kind of co-operation, the raising of capital, the financing.

Also in this phase UNIDO assistance can be offered.

Fifth Phase: Implementation of the Project

Part of the consultations and discussions will still continue in this phase, in particular the final agreement for the contract with the supplying company, the definitive management contract.

An institutional and personal settlement nevertheless seems to be advisable already at the time of the investment decision.

The main objective of this fifth phase is the establishment of the factory, the creation of the internal organization, the employment and formation of the labour force. A detailed description of the various tasks to be managed will be given in the economic feasibility study.

As a principle the Government should try to make the supplying company responsible for a satisfactory investment and set up.

In case no agreement on the management of the cement works could be worked out at this stage or if there are other difficulties, UNIDO can give DPAS assistance for this phase. ?

b) Time-table - see annexe

4. Co-operation with Bourgeois and party

Private investors can certainly contribute useful assistance in establishing and running the cement works. It is therefore recommended to make best use of their services for the sake of the economy of Vanuatu. But at the same time it is advisable to pursue the preparations of the project independently of the private investors to have an impartial basis for the decisions to be taken. A continuous discussion at the different stages of the project would certainly be productive.

If you agree with the proposed proceedings I request you to give your written consent by a letter to UNIDO Headquarters in Vienna so that I can prepare all the necessary measures after my return to Vienna. This might limit the time lags to a minimum.

Second Phase: Technical Part of Feasibility Study

A cement engineer should analyse all aspects of the technical feasibility of the cement works with particular regard to the following questions :

- to take samples in co-operation with the geological department in such quantities that are sufficient for a pilot test;
- to determine the technology based on the results of the test;
- to make a plan and lay out of the cement works;
- to establish a manning table and to organise and describe all technical requirements;
- to establish the investment costs, production costs etc.;
- to establish a time-table for the implementation of the project with details on implementation costs etc.

Third Phase: Financial Analysis and Evaluation of the Project

Based on the market study and the technical feasibility study with all cost elements, a final document is to be prepared to allow a definitive decision. -- This final analysis shall compile all the economically important aspects of the cement factory and provide detailed information for the investment decision. It should be carried out by an industrial economist. It is desirable that the industrial economist and the cement engineer work together for at least one or two weeks to settle all the inter-disciplinary questions. It would perhaps be advisable to have a separate study on transport economics done.

All these problems can be solved through UNIDO when recruiting experts for the studies.

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Fourth Phase: Negotiations within the Government and with potential foreign investors and partners to prepare the Investment Decision.

Since this cement project represents a very complex matter, during the time of preparing the studies frequent discussions with interested private investors should take place. They could already be the basis for a future co-operation.

At the time of taking a decision at the latest, the questions of co-operation and the kind of partnership have to be settled.

- g) The revenue of the Government as shareholder will be considerable in addition to the tax revenue from the cement work.

2. Development strategy

Being aware of the importance of this project there is a great governmental interest in it. But at the same time foreign private investors will show their interest in the development of the cement industry. For that reason it is necessary that the government encourages and uses private initiatives but plays at the same time an active role in the overall development. It is important for the government to dispose of any possible information and to take part at any decisions being taken in context of cement project. This requires an independent project study and preparation for decision making.

It is recommended to carry out such an independent study with the assistance of UNIDO / UNDP.

This does not exclude private studies which could be used for comparison and control.

3. Major development phases and time-table

- a) For the realization of the cement project the following phases are to be distinguished :

First Phase: Market Study

Since the prerequisites from the geological point of view seem to be guaranteed and Vanuatu disposes of best potential facilities for transport and there are no technical problems, the development of the project depends mainly on the results of the market study. Since the capacity will be around 200.000 tons per year the main markets can only be countries with a large number of population. The countries in question are Australia, Papua New Guinea and Singapore. It is envisaged to export to these countries 90 to 95% of total production.

It is the objective of the market study to analyse these markets and the world market. For this purpose Mr Eder will visit the above mentioned countries from June 17th to June 30th, 1981. He will then discuss the results of the journey with UNIDO - Headquarters in Vienna and complete the market study by the end of July. This study should be sufficient to make a decision on the further development of the project.

In case of a positive result it can be proceeded to the next phase.

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15th June

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CP/be

UNIDO Headquarters VIENNA
via
UNITED NATIONS DEVELOPMENT PROGRAMME
Private Mail Bag
S U V A
FIJI

Subject : Consultancy services and further programme of assistance

Dear Sirs,

After discussing the results of the economic survey on manufacturing industry and the insight obtained in various travels and based on the experience of Mr. Eder's one year activity as team leader of the UNIDO project N°. VAN/79/CO1 : "Small and medium scale enterprises promotion and development", the Government would like to specify the use of the consultancies, foreseen in this project, as follows (the projects are listed according to their priority) :

1. Cement works : six to eight man months as outlined in a memorandum prepared by O.D.E. (copy attached).
 2. Copra mill : two to three man months to have an independent study on all aspects of a local copra mill.
 3. Industrial planning : three man months to formulate an industrial development policy and strategy including a proposal on the set-up and organisation of the industrial administration and to complete the section on manufacturing industry for the development plan.
- It would be appreciated if Mr. Eder could be recruited for this consultancy taking into account his competence and special experience in our country.

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4. Small-scale tannery and leather industry : two man months to investigate the possibilities based on the output of the local abattoirs and to elaborate the investment projects accordingly.
5. Animal feed : one man month to elaborate a project to transform the abattoir by - products into appropriate feed for chicken, pigs and cattle.

In a final discussion with Mr. Eder it was agreed upon that after his return to Vienna he will elaborate detailed job descriptions for the above consultants in accordance with UNIDO.

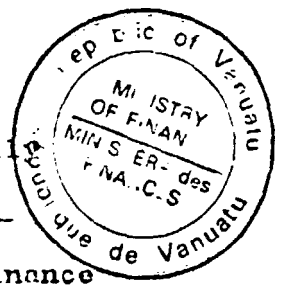
The above listed consultancies can be entirely financed out of the budget of the present UNIDO project N°. VAN/79/001.

The Government would be very grateful if the desired consultants could be provided as soon as possible to help this Government to overcome the problems of after-independence in the shortest possible time.

Thanking you for your cooperation and assistance, we remain,

Yours faithfully

K. Kalsakau
K. Kalsakau
Minister of Finance



Appendix A

A Selection of Publications on Cement

Duda, Walter H.: Cement Data Book, Int. Process Engineering in the Cement Industry
Niesbaden and Berlin, 1977. Labahn, Otto: Memento de l'Ingenieur en Cimenterie,
Niesbaden and Paris, 1964

World Cement Directory - 1977

The Directory tabulates information on the Cement Industry throughout the world, including the location of plants, number and type of kilns, fuel used, production and capacity figures at the end of 1976 with estimates up to 1979, cement types, brand names and number of persons employed. Details of associations and institutes concerned with information and research in the field of cement and concrete are also included.

West European Cement Directory - 1976 + Map

This publication lists the cement plants of Western Europe giving tabulated information on the number and type of kilns, capacities, production, types of cement produced, brand names, etc. up to 1st January, 1976. Also listed are the various cement associations and institutes in each country.

World Cement Market in Figures 1913-1977 (including Statistical Review n° 35) - 1976

A unique publication covering practically all countries of the world and containing data on cement production, imports, exports and consumption for the period 1913-1977.

Annual European Review n° 1 (ex. Cement Market and Outlook) - June 1979

An annual bulletin reviewing the development of, and outlook for, the cement market with special emphasis on Europe. Factors taken into account include developments in building and the building materials industry, distribution trends, prices, sales, production, trade between countries, etc.

World Statistical Review n° 1 (ex. Statistical Review) - November 1979

An annual publication which gives cement production, export, import and consumption figures, for practically all countries of the world.

A Comprehensive Method for the Chemical Analysis of Hardened Concrete - 1970

The method has been developed to serve as a basis for national and international specifications and as an agreed procedure in the event of disputes.

An International Reference Method for the Determination of the Heat of Hydration of Cements - 1972

The method based on the measurement of the heat of solution, is applicable not only to Portland cements, but also to cements containing blast furnace slag or pozzolana.

Recommended Procedure for the Measurement of the Heat of Hydration of Cement by the Conduction Method - 1977

This procedure, based on the measurement of the heat evolved by cement paste hydrating in practically isothermal conditions, complements the heat of solution method usually for ages of three days or more. It is applicable to all types of cement and makes possible the determination of the rate of heat evolution at any time.

Use of Concrete in Aggressive Environments - 1978

Following a series of laboratory tests which showed that none of the more or less accelerated test methods available gave a satisfactory appreciation of the resistance to attack, this recommendation based on extensive experience acquired through the observation of the behaviour of concrete structures built over the past decades in aggressive environments, was drawn up.

Cement Standards of the World - Portland Cement and its Derivatives - 1968

Cement standards in the 44 countries which have published national specifications. Portland cement as well as the various types of blast furnace and pozzolanic cements in which Portland cement clinker is the principal hydraulic constituent are included, and thus practically all cements employed in the normal range of construction work. (new edition 1980)

Reports - International Colloquium on Concrete Roads - Besancon, September 1978

This publication contains the texts of the eight reports presented by the principal speakers at the Colloquium. New developments in concrete technology and in the design of and machinery for concrete pavement construction are covered by this 203 page brochure in A4 format. (Texts in English, French or German with summaries in all three languages). The proceedings will be available in the first half of 1979.

Lightweight Aggregate Concrete - Technology and World Applications - 1974

A bound volume of 314 pages (in 22 x 30 format) of which 250 are illustrated. This publication shows the diversity of structures in lightweight aggregate concrete throughout Europe and the world, with numerous illustrations and a number of articles on the manufacture and technology of lightweight aggregate concrete written by leading experts in this field.

