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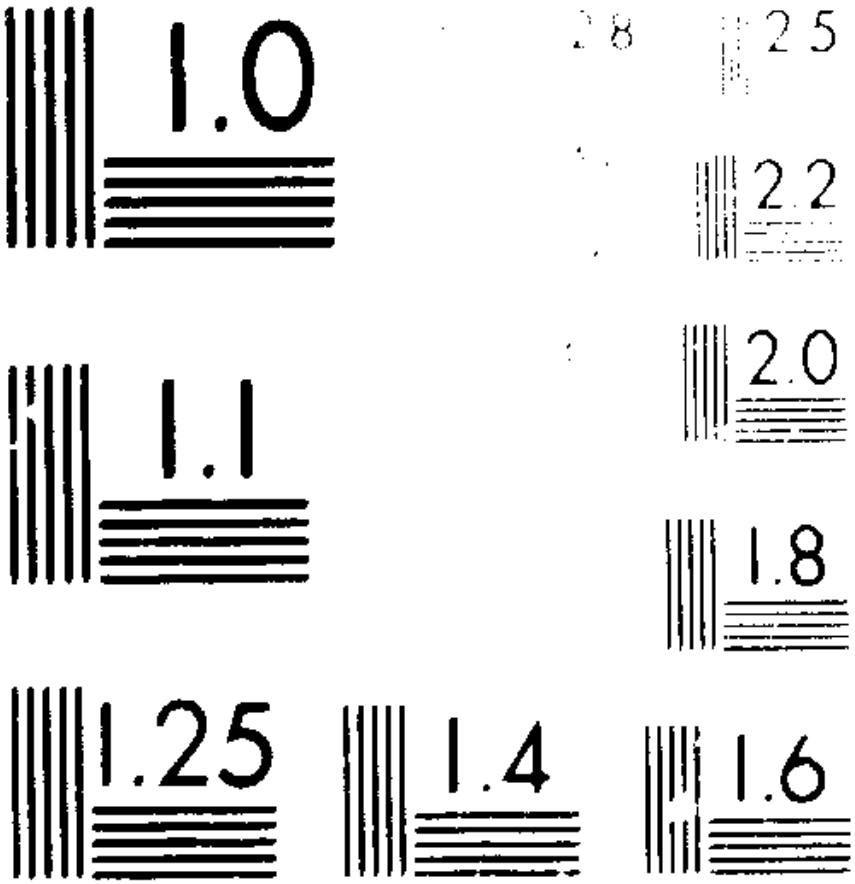
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Kingdom of Nepal

Final Report
Engineering Services to the Industrial Services Centre

Project Number: RP/NEP/80/004

March, 1981

W. D. Scott & Company Pty. Ltd.
Management Consultants

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ABBREVIATIONS

Currency: U.S. $1 = R_s 11.6 (11.6 Nepalese Rupee)
R_s 1 million = U.S. $86,207.

BSF	Birgunj Sugar Factory Ltd.
HMG	His Majesty's Government of Nepal.
HTI	Hetaudu Textile Industry Ltd.
IBRD	International Bank for Reconstruction and Development.
ISC	Industrial Services Centre.
NCCN	National Construction Company of Nepal.
NIDC	Nepal Industrial Development Corporation.
NPC	National Planning Commission, Nepal.
OPE	Out-of-pocket expenses.
UCI	Union Carbide India
UNDP	United Nations Development Program
UNIDO	United Nations Industrial Development Organisation
WDS	W.D. Scott & Company Pty. Ltd. Australia

1. INTRODUCTION

This Final Report contains the findings and recommendations of the consultants, W.D. Scott & Company Pty. Ltd. on the Nepal Engineering Services to the Industrial Services Centre (ISC) study authorised by the United Nations Industrial Development Organisation.

This Final Report has been prepared for submission after the receipt of UNIDO's comments on, and approval of, the Draft Final Report.

1.1 Terms of Reference and Objectives

The Terms of Reference are for Project Number RP/NEP/80/004.

In summary, the Terms of Reference state "The ISC has already attained a certain level of competence in conducting feasibility studies, undertaking economic evaluations of projects and in providing some extensive services in management consultancy and training.

The ISC does not yet possess the necessary requirements to provide engineering and management services during the implementation and putting into operation stages of industrial projects.

"The purpose of this project is to undertake a detailed study, in order to determine the exact requirement and scope of the project engineering and management services needed in the industrial sector of the country, with recommendations, including a detailed plan of action, to progressively close the existing gap in the I.S.C."

The Terms of Reference further define the immediate objectives "to strengthen the present Project Division of I.S.C. in order to improve and organise its project engineering activities" and further "thus the enhanced technical capabilities assimilated by the engineers will be diffused to other industries through I.S.C."

"The Project output is to be a final report with recommendations on how and with which inputs and in which span, the I.S.C. can acquire the capacity for effectively providing the required project engineering and management services."

The recommendations that follow are directed to fulfilling these objectives and at the same time taking account of particular constraints which exist. The recommendations also offer opportunities for UNIDO and other Aid Agencies to contribute to this National development.

1.2 Fieldwork

Mr. Eric Monsted of W.D. Scott & Company Pty. Ltd. undertook the fieldwork in Nepal from November 23, 1980, and this was completed within the specified seven weeks by January 12, 1981.

Mr. Monsted was familiar with Nepal and its industry requirements having been Team Leader for the UNIDO project in Mechanical Workshops, UF/NEP/78/108, in 1979 and this proved a time saving advantage.

He visited the Hetandu Industrial Estate and neighbouring projects as well as visits in Kathmandu Valley.

1.3 Associated Support in Nepal

This project was requested by the Industrial Services Centre (ISC) of His Majesty's Government in Nepal.

The Chairman of ISC, Mr. G.B. Shah, delegated the project responsibility to the Industrial Projects Division Chief, Mr. T.K. Sharma, who gave his active and full support including the support of his executives and staff.

The counterpart team comprised Mr. S.B. Karki, Chief of the Project Engineering Branch and his officers Mr. M.R. Bhandary, Mr. B. Sharma and Mr. M. Gongal. Mr. Bhandary had worked on the UNIDO Mechanical Workshop project. All counterparts were professionals covering the professions of mechanical engineering, electrical engineering, chemistry and business administration. Their contribution was greatly appreciated and our sincere thanks are recorded here. Similarly our appreciation is offered to the UNIDO Junior Professional Officer, Mr. J. de Boeck, for his professional guidance and support and also for his assistance with administration matters.

Visits were paid to various officials in Nepal as shown in Attachment 1. Their comments are embodied in the report and acknowledgement is gratefully given for their contribution.

2. SYNOPSIS OF FINDINGS AND RECOMMENDATIONS

2.1 Findings

2.1.1 Background (Section 3)

* Project Engineering has been a responsibility of ISC since 1974, and of their predecessor NIDC since 1959, but neither has undertaken any project engineering work.

* Private services to industry, both local and foreign, have provided the necessary project engineering for Government, Aid and private projects.

* Process design, other than the simplest, has been by foreign firms or experts. Similarly machinery design and manufacture has been by foreign firms.

2.1.2 Project Engineering in Nepal (Section 4)

2.1.2.1 Markets (Section 4.1)

a) Recent Trends

* NIDC investment and lending to industry have flattened in recent years.

* ISC feasibility studies, which can lead to industry investments and hence project engineering, have been reasonably constant at 25 studies per year. Of these approximately 50% are sourced from ISC/NIDC enquiries and 50% from private enquiries.

* Of the approximately 100 ISC feasibility studies performed over four years:

  40% were not feasible or dropped
  25% are awaiting action (up to 3 years)
  15% are still in process
  10% are being acted upon
  10% of the projects are completed.

* Recent investment performance as measured by NIDC lending and by ISC feasibility studies shows little encouragement for the type and level of project engineering that ISC is likely to be able to perform.

b) Future Prospects

* The future looks more optimistic.

* Feasibility requests by NIDC for 1981 are double the previous rate.

* An Industry Sub-Section Study for 1981 - 1986 shows many potential projects. This is further supported by an ISC study (by private consultants) on potential investments for the electrical industry.

* This is on the assumption that the present bottleneck in industrial investment funding is broken.

2.1.2.2 Competition (Section 4.2)

* Competition for the market is from various sources:

  Foreign Firms
  Owner Supervised
  Nepalese private consultants
  Aid Agencies.

* These are classified as to whether true competition, or ISC to assist, or ISC to participate for learning purposes.

2.1.2.3 Resources (Section 4.3)

* The resources available are:

  Engineers
  Draftsmen
  Contractors
  Clerical, accounting, audit.

Limits occur in some specialties, e.g. chemical engineers, machine design engineers, but in general adequate resources are available within Nepal and therefore to ISC for project engineering services.

2.1.2.4 Institutions (Section 4.4)

* The institutional relationships between NPC, NIDC, and ISC indicate overlaps and gaps as regards planning industrial development.

* The achieving through funding of industrial projects, other than HMG or Aid, depends heavily on NIDC and only at their discretion are other Departments involved.

2.1.2.5 Cost, Fees and Benefits (Section 4.5)

* Costs (Section 4.5.1)

  The budgettary and cost control systems which exist in ISC are suitable for project engineering activities.

* Fees (Section 4.5.2)

  The basis for a reasonable fee structure exists in ISC.

* Benefits (Section 4.5.3)

  National benefits to industry will result from developing project engineering.

* Examples of Project Engineering (Section 5)

2.1.2.6 Typical project engineering activities (Section 5.1)

* A network of the activities of project engineering is given and described.

* The overall supervision of project engineering activities is, and will be in this report, defined as Project Management.

2.1.2.7 A typical manufacturing industry project (Section 5.2)

* As an example of typical project engineering for a manufacturing industry the case of a "Dry Cell Manufacturing Plant at Kathmandu" has been selected and possible ISC and Nepalese participation defined.

2.1.2.8 Typical service industry project (Section 5.3)

* The role of ISC in project engineering for hotels is described.

2.2 Recommendations (Development Strategy - Section 6)

2.2.1 Role of the Industrial Services Centre (Section 6.1)

* The role of ISC in project engineering will be initially by consultancy but ultimately as competence is gained by accepting executing responsibility for project planning, construction and commissioning.

2.2.2 Marketing (Section 6.2)

* The marketing steps are:

- Identify prospect
- Present proposal
- Conduct general promotion activity.

Details are given as to how this should be done.

2.2.3 Recruitment Training and Motivation (Section 6.3)

2.2.3.1 Recruitment For Manufacturing Projects

Growth figures are given.

2.2.3.2 Recruitment For Hotel Projects

Growth figures are given.

2.2.3.3 Training

* Overseas training should be primarily directed to ISC participation with overseas private firms in the design and planning of individual projects.

Also attending appropriate seminars and short duration conferences.

* Learning through doing should be the main thrust. Opportunities exist.

* Internal training should be arranged.

* The Library should be developed.

2.2.3.4 Motivation

* There are restraints which have to be overcome by HMG.

2.2.4 Time Scale (Section 6.4)

The time period selected is from 1981 to 1986. A program is given.

2.2.5 Controls (Section 6.5)

A control approach to ensuring profitability for ISC is given.

2.2.6 Aid Assistance (Section 6.6)

Aid can:

* Assist investment in industrial projects. (Section 6.6.1).

* Promote Nepalese participation in Aid Projects (Section 6.6.2).

* Provide for ISC project engineering office (Section 6.6.3). (US $12,000).

* Fund for overseas conferences (Section 6.6.4). (US $6,000).

* Provide Aid experts (Section 6.6.5).

  - Project Engineering Development Expert UNIDO (Section 6.5.5.1). (US $160,000).

  - Technical Support Experts UNIDO (Section 6.5.5.2). (US $80,000).

* Provide for a Pilot Factory Project, UNIDO (Section 6.6.6). (US $200,000 & Rs 100,000).

* Provide library reference Aid (Section 6.6.7). (US $500).

2.2.7 Government Assistance (Section 6.7)

HMG can:

* Assist and encourage industrial investing.

* Require that Nepalese project engineering services participate to the maximum in Government Aid and private industrial projects.

* Provide any necessary subsidies and risk insurance to ISC during the initial stages.

* Provide a motivational environment through career and financial incentives for ISC and other Government staff to seek project work as distinct from desk activities.

7. Conclusion

The initiative and the follow-through for success are with ISC.

3. BACKGROUND

3.1 ISC and Project Engineering

Since its inception in November 1974 a specific objective of ISC has been to provide project engineering services. In the 1975 "Functions of Departments and Job Descriptions" an objective of the Centre was "- To undertake detailed engineering of industrial projects" which is further defined as a main function for the Industrial Extension Services Division, Project Engineering Branch "- To develop expertise in the following subjects with a view to undertaking project engineering services:

- process design
- engineering design
- technology adaptation
- installation work
- control through network analysis
- general project management, handling financial planning and developing of costing systems during the implementation period."

The Job Description of the Chief Project Engineering Branch expanded on the above to include annual work plans for the Branch and selection and training of Branch staff.

Further, in the 1974-1979 "Introduction and Brief Perspective of the Industrial Services Centre", the Industrial Projects Division is listed as having three branches:

a) Feasibility Branch

b) Project Engineering Branch

c) Project Management Branch.

The distinction between these (1979) Project Engineering and Project Management Branches and the previous (1975) Project Engineering functions is that the new Project Engineering is responsible for design and planning whereas Project Management will select and supervise for construction and commissioning of plants.

At present, 1980/81, the Project Engineering and Project Management Branches are again recombined as the Project Engineering Branch consisting of a Chief and three engineers as staff.

3.1.1 However, at no time since 1974 to the present has ISC undertaken project engineering as defined.

3.2 NIDC and Project Engineering

NIDC is the forerunner of ISC and was formed in 1959. As presently constituted NIDC is empowered to "engage in industrial consultation and training -" and has a Project Implementation and Follow-Up Division which, in part, is "to assist and advise clients at the construction stage as well as in operation in obtaining machinery and equipment, spare parts -".

Notwithstanding the above it is clear from the remainder of the NIDC charter and its present practice that NIDC "functions more as an industrial bank - principally concerned with equity participation in and advancing medium and long term credit to industries rather than an institution responsible for preparing feasibility reports and providing technical help".

(Source for the above quotations is Nepal Industrial Development Corporation, An Introduction).

3.2.1 As in the case of ISC to date NIDC has not performed project engineering services as defined.

3.3 Industry and Project Engineering

It is apparent by default that whatever project engineering in industry has been provided in Nepal has been by private industry and/or by Aid services.

The private industry sector services were by Nepalese firms (mainly as in building designs and constructions) and by foreign firms (mainly as in process design, machinery design, installation, commissioning, etc.)

Aid work was predominantly by foreign firms both in consulting and contracting due to the projects' large scale or technical sophistication. Refer Attachment 5.

3.3.1 The private industry project engineering services have been in both consultive and executive roles.

3.3.2 All process design of other than the simplest form has been by foreign firms or experts. Similary machinery design and manufacture has been by foreign firms.

4. PROJECT ENGINEERING IN NEPAL

4.1 Markets

In order to gain an indicator to the potential markets for project engineering services a review is made of recent industrial investments and prospects plus an analysis of the forecast growth for the period to 1990.

Statistics are incomplete in Nepal. Also information is not fully available on the status of investments and planned investments. In these cases interpretations of the likely position have been made based upon opinions expressed by the officials concerned.

The very large and the very small projects have not been included as not being suited to ISC contribution. This is because the very large are usually Aid managed and the very small such as Cottage Industries do not represent a potential market.

Only those projects which sought credit from NIDC have been considered since direct financed are government or Aid financed, or are totally private financed, which are unlikely to seek ISC services. The exceptions to this, such as possible ISC participation in Aid projects for training purposes are referred to individually in the appropriate section of the report.

4.1.1 Recent Trends

NIDC Investment in Projects

The latest obtainable report from NIDC on the status of projects is July 1978. This shows the following:

Table 4.1

NIDC Projects 1965 to July 1978

	Completed Projects		Projects Under Implementation	
	Number	Loan Value Rs Thousand	Number	Value Rs Thousand
1. Mine and Forest Based Industries	16	35,197(a)	9	50,995(c)
2. Agro Based Industries	41	55,602	13	26,153
3. Services & Miscellaneous	19	26,352	3	4,897
4. Hotels & Travel Agencies	25	44,979(b)	17	103,997(d)
	101	162,130	42	186,042

Including (a) Himal Cement Co. Rs 35,100,000
(71% of total investment)

(b) Hotel de L'Annapurna Rs 17,042,000
(38% of total investment)

(c) Nepal Livestock Rs 13,148,000
Vegetable Ghee 17,667,000
(60% of total investment)

(d) Hotel Soaltee Rs 28,315,000
Hotel Kathmandu Rs 21,276,000
Hotel Everest, Kathmandu Rs 24,174,000
Hotel Jaya International Rs 21,896,000
(92% of total investment)

Source: NIDC

Comments

1. Mine and orest Based Industries. Excluding the large projects (footnotes (a) and (c) above) there are no significant items. Projects Include brewery, bottle plant, furniture making, rock crushing, plastics, soap etc.

2. Agro based Industries. The majority are rice mills with some bakeries, flour mills, solvent extraction and khandasari (small scale sugar) mills.

3. Service and Miscellaneous. No particular pattern. Indicates cold storage, engineering, power supply, knitting etc.

4. Hotels and Travel Agencies. Predominantly hotels and lodges with a few tourist vehicles. Five hotels (footnotes (b) and (d)) represent 76% of total Hotel and Travel Investment.

Further analysis regarding dates of loan approval is meaningless since signing of loan documents is delayed by up to 6 years and commonly between 3 months and 2 years.

1.1.2 A separate study prepared by ISC "Industrial Sector Plan Study" December 1979 includes the following comments on NIDC:

"some parallel (of NIDC lending) appears to exist with (National) production figures with a rising trend up to 1974/75 and apparently a levelling off or decline thereafter (to 1978)
- Currently the NIDC "pipeline" is very short, and largely consists of hotels, trekking lodges and a few processing units". Refer Figure 4.1.

Figure 4.1

NIDC Investment (Rs million)

	1970/1	1971/2	1972/3	1973/4	1974/5	1975/6	1976/7	1977/8
Current Price	12.0	7.6	14.2	23.1	53.8	43.3	72.1	32.1
Constant Price	13.0	7.9	14.2	21.1	41.4	30.9	43.1	20.9

Note: Base Year 1972/3 = 100 Index = non food price index of NPB.

Source: ISC as above.

Discussion with NIDC, ISC and IBRD confirmed that little NIDC investment had occurred in 1979 and 1980 statistics were not obtainable.

4.1.2 ISC Feasibility Studies

The feasibility studies undertaken by ISC are an indication of the possible projects forthcoming.

The number and source of feasibility studies prepared by ISC from 1975 to July 1979 is given in Table 4.2.

Table 4.2

Feasibility Studies Prepared by ISC and Source of Enquiry

Study Source	1975	1976	1977	1978	6 Months July 1979	Total
ISC	1	4	4	-	-	8
NIDC	1	8	8	13	8	38
HMG	-	2	3	6	1	12
Private	7	15	14	11	5	52
Total	9	29	28	30	14	110
Total Excluding HMG*	9	27	25	24	13	98

Source: Industrial Services Centre. Refer Attachment 2 for detail.

* The studies requested by the Government are excluded here because they were in general for industry, regional or market studies which do not directly result in project engineering and therefore do not represent a potential market for the Project Engineering Branch.

By linking the ISC and NIDC studies as being of similar nature it can be seen that over the 4 1/2 year period from 1975 to July 1979 that 98 studies (excluding HMG enquiries) were undertaken with the source of the enquiry being 46 from ISC/NIDC and 52 from private enquiries.

4.1.2.1 Or, in general, that since 1976 (ignoring the start-up year of 1975) some 24 to 27 feasibility studies were undertaken by ISC each year with an approximate 50:50 split between ISC/NIDC and private enquiries.

4.1.2.2 Further analysis shows that of the 1976 to July 1979 studies (excluding HMG) the following was the position:

A 40% of projects were not feasible or dropped.

B 25% are awaiting action (up to 3 years)

C 15% of studies are still in process

D 10% of projects are being acted upon

E 10% of projects are complete.

There was no significant difference between the results of NIDC/ISC initial studies and those of private firms.

4.1.2.3 The categorization of the sectors studies by ISC when matched to those of NIDC show a similar pattern with the exception of hotels and travel. Refer Table 4.3

Table 4.3

	No. of NIDC Projects	No. of ISC Projects
1. Mine & Forest based Industries	27	26
2. Agro based Industries	54	45
3. Services & Miscellaneous	22	24
4. Hotels & Travel Agencies	42	7

This indicates that ISC is undertaking a reasonable spread of industry studies except for hotels and travel projects. Also some of the ISC hotel studies were for the large approved hotels.

4.1.2.4 The listing of project feasibility studies for July 1979 to the present is not available but is stated to be approximately 20 per year with the majority, if not all, of the feasible projects awaiting investors or funds.

4.1.3 Conclusion

Recent investment performance as measured by NIDC lending and by ISC feasibility studies shows little encouragement for the type and level of project engineering that ISC is likely to be able to perform.

4.1.4 Future Prospects

The future looks more optimistic. The "Industrial Sector Study" prepared by ISC for NPC indicates some 187 small to large scale projects for the Sixth Plan Period (1980/81 - 1985/86) of which 24 will be in the public sector (total investment Rs 2,893 million) and 163 in the private sector (total investment Rs 1,009 million). Refer Attachment 3 for details.

That these may be understated is indicated from the "Machinery, Equipment and Components Sector" where 12 projects are listed (total investment Rs 30.49 million) whilst a private consultant firm is currently preparing a preliminary feasibility listing for promotion of some 90 products for local manufacture for electrical goods only.

Also NIDC has, as at January 1981, approved a listing of 22 feasibility studies required from ISC. This is nearly double the number of previous annual requests.

Considering that ISC project engineering services are initially small and at the maximum could handle no more than four projects concurrently (and would be satisfied with one project initially) there appears scope over the next five years for solid development.

This must be on the assumption that the present bottleneck in industrial investment funding is broken.

4.2 Competition

The competition for the project engineering market can come from several sources as below.

4.2.1 Foreign Firms

Industrial projects generally have a foreign component. Either foreign equipment or including foreign participation in ownership.

Past practice has therefore been for the local partner of the lending agency to accept a turn-key project or a foreign supervised construction, installation and commissioning.

This is seen as the major competition to overcome if the full national benefits from project engineering are to be achieved.

4.2.2 Owner Supervised

An alternative is for the local owner to directly arrange and supervise the selection of equipment through to commissioning of the project.

The role of ISC in this situation is not as competitor but as an additional source of technical and management expertise to assist the owner where economic.

4.2.3 Nepalese Consultants

In at least part of most projects there exists the practice of using Nepalese consultancy, usually by private firms.

Again the purpose is not for ISC to compete but to assist and co-ordinate where economic and on some occasions to learn by working with these local firms.

4.2.4 Aid Agencies

Aid projects are usually provided with foreign expertise and often contracting services.

It is intended that ISC be in a position to advise regarding the availability and competence of Nepalese sources so that these can be considered for segments of the project. Also, where practicable, for ISC or other Nepalese individuals and firms to work in consortium with the foreign experts to gain the maximum technology transfer, including project engineering.

4.3 Resources

4.3.1 Engineers

4.3.1.1 Within ISC, including the Industrial Estates Division, there are the following engineers.

* At Management Level (Division Chief and above)

  1 Chemical Engineer
  1 Metallurgical Engineer
  1 Industrial Engineer

* At Management Level (Branch Chief)

  1 Chemical Engineer
  4 Mechanical Engineers
  1 Civil Engineer
  1 Industrial Engineer

* At Senior Professional Level (Senior Officer)

2 Mechanical Engineers
1 Argicultural Engineer

* At Professional Level (Officer)

1 Chemical Engineer
1 Mechanical Engineer
2 Civil Engineers
2 Electrical Engineers
1 Metallurgical Engineer

The Senior Management Level engineers are not available for project activities.

The Management Level engineers are similarly not available except the Project Engineering Branch Chief (Mechanical Engineer) if the present ISC organisation structure and duties are maintained.

At the Senior Officer and Officer Level, engineers could be drawn for project work. These are:

1 Chemical Engineer
3 Mechanical Engineers
2 Civil Engineers
2 Electrical Engineers
1 Metallurgical Engineer
1 Agricultural Engineer

That is, all the core professional engineering skills are represented in ISC but are few in number.

4.3.1.2 Chemical Engineers, Nepal

There are 17 Chemical Engineers known in Nepal. Of these two have moved to the USA and are not available. Three are with ISC as listed in 4.3.1. Three are with NIDC, one is with the Law Forum, one with Nepal Institute of Standards, one with the Department of Industry, and one with the Department of Village and Cottage Industries.

Three are with Himal Cement Company, one with Butwal Plywood Industries and one with Birgunj Sugar Factory.

None are listed as being with private consulting engineers.

As a national resource for project engineering possibly one could be drawn from NIDC and one or two from Himal Cement Company, apart from ISC.

Nationally then Chemical Engineers in Nepal must be seen as a very scarce resource with less than four possibly available to work on projects.

4.3.1.3 Other Engineers, Nepal

No listing was obtainable of the numbers of other professional qualified engineers in the core skills. However it is known that some 1,000 engineers are members of the Nepal Engineers Association (NEA) which is only open to professionally qualified engineers. Also that probably no more than 50% of qualified engineers are members of NEA.

The stated spread is approximately 75% civil including architects, 15% electrical and 10% mechanical, so it appears that some hundreds of each skill should be available within the country, and that these could be drawn from either private consultancy firms or government for specific projects.

Similarly it can be assumed that experience levels are such as to permit design, construction and installation for civil and electrical projects but that machine design and process design in mechanical engineering have not been undertaken to any extent in Nepal.

A total of 135 private consulting engineering firms are known in Kathmandu. Refer Attachment 6. Not all are active and most draw their engineers from the government service as required. Bio data of the firms' or the individuals' experience is not available.

Also some 40 firms are members of the Nepal Consultants Association which is for management consultants. Refer Attachment 7.

4.3.2 Draftsmen

4.3.2.1 Draftsmen ISC

Within ISC there are draftsmen for plan drawing for the industrial estates and for feasibility study reports etc., but there are no detail or design draftsmen for civil, mechanical or electrical engineering.

4.3.2.2 Draftsmen Nepal

No figures are available on the numbers of draftsmen in Nepal but training is provided by vocational schools.

No particular scarcity is reported by architects and it is assumed that suitable numbers can be recruited and given training, guidance and supervision for project work.

4.3.3 Contractors

4.3.3.1 Contract Capacity ISC

ISC has no construction contracting capacity. Work on the industrial estates is let to private contractors. Note that it is not proposed that ISC have contract capacity.

4.3.3.2 Contractors Nepal

Nepal has 1,200 contractors ranging from the government owned National Contractors Company of Nepal (NCCN) to small private companies formed on an ad hoc basis for individual contracts. Most are in civil work.

Nepalese contractors generally only provide for small to medium projects with the Aid and very large government contracts being granted to foreign firms. There are a number of reasons for this including lack of previous experience, shortage of equipment, low capitalisation for guarantee and operational purposes, and the high interest charged for bond guarantees. It is the intent of HMG to further foster Nepalese participation in their projects by dividing the large projects into smaller segments.

No clear cut decision can be reached on the availability and suitability of Nepalese contractors as each project must be evaluated on a case-to-case basis but certainly segments, if not all, of an industrial project can be handled by Nepalese firms.

4.3.4 Clerical, Accounting, Audit

4.3.4.1 Clerical, Accounting, Audit, ISC

No problem is foreseen in ISC providing the clerical, accounting and audit staff needed for project work.

Special training and procedures will be required.

4.4 Institutions

4.4.1 The planning of industrial development is by various government institutions:

Nepal Planning Commission (NPC) for economic and sector planning.

Industrial Services Centre (ISC) for preparation of feasibility studies for individual projects.

Nepal Industrial Development Centre (NIDC) for industrial banking evaluation and project promotion.

There is overlap between these three major bodies as for example ISC assisted NPC in the preparation of the Industrial Sectoral Plan Study or ISC also has responsibilities for the promotion of industrial development as does NIDC.

Also there are some gaps between the sections as for example on the completion of a feasibility study by ISC and its submission to NIDC there is no requirement for following up or assisting in development.

4.4.2 The achieving through funding of industrial projects, other than HMG or Aid, depends heavily on NIDC and only at their discretion are other departments involved.

4.5 Costs, Fees and Benefits

4.5.1 Costs

4.5.1.1 The present costs of the ISC Project Engineering Branch are virtually fixed by the establishment numbers, pay scales and allowances, and general usage of the ISC motor vehicles and administrative services. Variables would be in travel or in printing of feasibility reports.

Present budget and cost procedures separate into Division and Branch activities based on likely activities.

4.5.1.2 As project engineering services develop there will be variation in the professional staff numbers and levels, additional staff and costs for drafting and project control, greater demand on vehicles for project services and for space and office equipment. There may also be financing costs involved in bonds, guarantees and insurance premiums.

These costs can be budgetted and costed as at present, based firstly on the estimated level of activity, i.e. how many projects and also for each individual project.

4.5.2 Fees

4.5.2.1 The fees to be charged for project engineering services can be considered in two parts:

1. Professional fee
2. Out of pocket expenses

4.5.2.2 Professional Fee

The professional fee is for time spent and responsibility taken.

* Present practice by ISC for their feasibility studies is to quote a fixed fee (generally ranging from Rs 15,000 to Rs 50,000 per study) in advance of the study.

* Present practice by consulting engineers is generally to charge a fixed percentage (ranging from 5% to 1% of project cost) negotiated in advance with the client. This practice however has disadvantages in that the lowest quote is generally accepted without due consideration of technical competence.

* An alternative for consulting engineering is to quote a fee based upon the estimated work content for the consultants plus a margin for overheads and profit. This is common practice for international and Aid bidding and usually follows proof of technical competence.

* The final alternative is to quote on a "cost plus" basis. This would only be reasonable where there were considerable unknowns beyond the control of the consultant since it faces the client with an unknown final bill plus the possibility of an inefficient consultant.

* Therefore ISC should initially prepare their fee estimate and derive a fee quotation from this. The fee quotation may differ from the fee estimate because of competition (or lack of it), the training aspects ISC can derive, etc.

  Also as an initial step that ISC estimate time charges based upon a factor of between 2 to 4 times the wage costs (refer 6.5).

  The estimated financing costs, urban travel, etc., are included as part of the professional fee. For subcontractors it is recommended that ISC include a quote of their fee plus 5% for administration.

4.5.2.3 Out of Pocket Expenses

The out of pocket (OPE) expenses are those actually incurred in the project and reimbursable from the client at cost.

* Normal OPE include out of town travel and accommodation, special reproduction expenses such as reports and drawings, communication expenses, freight, customs payments etc.

* In preparing a quotation it is recommended that ISC estimate the OPE and include the likely range to the client. Variations above this range will require later negotiation with the client and therefore should be avoided by thorough estimating.

4.5.3 Benefits

4.5.3.1 The benefits sought through greater Nepalese participation in industrial project engineering include those defined in the Terms of Reference. That is:

- improve the balance of payments by encouraging use of indigenous technical manpower;
- enhance the technical capabilities of engineers;
- use the scattered technical resources for the development of the country and supplement the technical resources gap;
- promote employment in the engineering profession;
- develop engineering industries in the country; and
- decrease the import content in the industrial projects.

4.5.3.2 In addition, as Nepalese project engineering expertise increases, the following benefits can be anticipated:

- lower project engineering costs for the client;
- a shorter project implementation time period;
- a marked substitution of Nepalese labour for foreign labour in construction and installation;
- greater confidence in promoting further industrial projects; and
- enhanced ability to evaluate alternative processes.

5. EXAMPLES OF PROJECT ENGINEERING

5.1 Project Engineering Activities

A network of the activities in developing and implementing an industrial project is given as Figure 5.1. (For convenience in following the text this figure can be left extended).

The elements between (2) and (14) represent the project engineering activities whilst the elements (0) to (2) illustrate the prior activities in developing the project.

The overall element 2-14 is Project Engineering Supervision which is more commonly known as Project Management since this is what it encompasses. In the text it will be referred to as project management.

Element

0 - 1 Feasibility Study

Includes

Project background

Market study and marketing requirements

Technical analysis

Materials and imports

Plant location

Manpower and organisation

Plant selection and production program

Financial evaluation

Economic evaluation

Recommendations

Presently prepared by

ISC Industrial Projects Division

NIDC Project Analysis Division

HMG Departments

Aid Agencies

Nepalese Consultants

Foreign Consultants

Local or Foreign Entrepreneur

1 - 2 Promotion of Project and Selection of Investors, Funding and Company Formation

Includes

Advising or advertising of project possibility

Identification of likely local and foreign partners

Decision regarding HMG equity participation

Negotiation of equity and loan funding

Fulfilling legal and statutory company requirements

Presently prepared by

NIDC Promotion and Publicity Division, Project Analysis Division and Project Implementation and Follow-Up Division

HIM Departments

Nepalese and Foreign Legal Firms

2 - 3 Process Design

Includes

Selection of technology

Selection of process including production, finishing, packaging, handling, transport, testing

Matching of equipment and control criteria

Specification of equipment and suppliers

Establishing key performance and control criteria

General layout of space

Determining utilities and services requirementss

Presently prepared by

Aid Agencies

Foreign consultants

Foreign entrepreneurs

Foreign suppliers of equipment

3 - 4 Site and Layout Specification

Includes

Detail location and availability and preparation of site

Detail drafting(a) of building locations and size

Design of access ways

Specification of utilities and services and availability

Specification of physical security against loss or damage

(a) "Drafting" in this report refers to engineering plan design and drawing and the reproduction of such plans. It is not legal drafting of legislation.

Presently prepared by

ISC Industrial Districts Co-ordination Division

Local and/or foreign partners

Local and/or foreign consultants

Aid agencies

4 - 5 Civil Engineering Design

Includes

Detail design and drafting of civil engineering works, buildings and services including waste disposal

Estimates of manpower, equipment, material, cost and time for civil engineering works

Network control chart of works

Preparation of tender documents

Presently prepared by

Nepalese consulting engineers and architects

Foreign consulting engineers and architects

HMG engineers and architects - for government work

4 - 6 Mechanical Engineering Design

Includes

Detail design and drafting of mechanical equipment and layout

Detail specification of ancilliary equipment such as generators, boilers, air conditioning, compressors, fuel storage, materials storage, mechanical handling, etc.

Specification of installation of equipment.

Estimates of manpower, equipment, material, cost including delivery on site and time of supply and installation as relevant

Network centre chart of supply and installation

Preparation of Tender documents

Presently prepared by

Foreign supplier or partners

Foreign consulting engineer

Aid Agencies

4 - 7 Electrical Engineering Design

Includes

Detail specification and design including drafting of electrical supply from High Tension to point of usage. Includes specification of transformers, stand-by power generators if needed, circuit breakers, transmission lines and low voltage circuits

Design to meet relevant Nepalese standards or in their absence the standards of supplier country for safety, fire, climate and any special hazardous conditions. Design to be economic from both capital and tariff viewponts

Estimates of manpower, material, equipment, cost and time of supply and installation and connection

Network control chart of supply and installation

Preparation of Tender documents

Presently prepared by

Foreign consultant, supplier or partner

Some participation by HMG Department of Electricity and Nepalese consulting engineers

5 - 8 Tender for Civil Contractors

Includes

Advertising for civil engineering contractors for either or both site preparation and civil engineering (including buildings)

Separate tenders may be called or accepted for parts of the total civil engineering, e.g. drainage separate, painting separate, etc.

Preparation of criteria for evaluating tenders received to ensure technical competence and maximum, if not total, Nepalese participation

Evaluation and ranking of tenders received

Presently prepared by

Local consulting engineer

Foreign consulting engineer

Local and/or foreign partners

Aid Agency

6 - 9 Tender for Mechanical Contractors and Suppliers

Includes

Advertising for mechanical equipment suppliers, transport agents and installation contractors. Separate tenders may be called or accepted for part supply or contracting

Preparation of criteria for selection of tenders

Evaluation and ranking of tenders

Presently performed by

Local and/or foreign partners

Foreign consulting engineer

Aid Agency

7 - 10 Tender for Electrical Suppliers and Contractors

Includes

Advertising for electrical equipment suppliers and contractors. Separate tenders may be called for part supply but contracting should be completed (except for connection by HMG)

Preparation of criteria for evaluating tenders

Evaluation and ranking of tenders

Presently performed by

Nepalese consulting engineers

Local and/or foreign partner

Foreign consulting engineer

Aid Agency

8 - 11 Supervision of Civil Engineering Contractors

Includes

Supervision of site preparations, prefabrication of components, building construction, civil engineering services construction, access roads, fences etc.

Monitoring and control of costs, time and results

Reporting and recommending on a regular basis to the owner and HMG

Approval of part payments

Recommendations of any extras or variances including requests for funds

Presently performed by

Nepalese consulting engineers

Local and/or foreign partner

Foreign consulting engineer

Aid Agency

9 - 12 Supervision of Mechanical Equipment & Supply and Installation

Includes

Supervision of the supply and delivery of mechanical equipment as to standard and delivery time. Approval of payments for supply and delivery. Recommendations on modifications or variances from standard in cost, time or performance

Supervision of the installation of mechanical equipment. Approval of part payments for installation

Recommendations on extras or variances, including request for funds. Monitoring and control on costs, time and results. Reporting and recommending on a regular basis to the owners and HMG

Presently performed by

Local and/or foreign partners

Foreign consultants or contractors

Aid Agency

10 - 13 Supervision of Electrical Equipment Supply and Installation

Includes

Supervision of the supply and delivery of electrical equipment and materials as to standard and delivery times. Approval of payments for supply and delivery. Recommendations on modifications or variances from standard in cost, time or performance

Supervision of the installation, wiring and connection of electrical equipment. Approval of part payments.

Recommendations on extras or variances including request for funds. Monitoring and control on costs, time and results. Reporting and recommending on a regular basis to the owners and AMG

Presently performed by

Local and/or foreign partners

Foreign consultants or contractors

Local consulting engineers

Aid Agency

12 - 14 Commission Plant

Includes

Test runs of all equipment separately and as a process to ensure performance standards are achieved in production rate, quality material usage, labor productivity, costs.

Prepare manuals for operating and maintenance

Presently performed by

Local and/or foreign partners

2 - 14 Project Engineering Supervision
(Project Management)

Includes

The planning, guidance, direction and monitoring of the engineering, cost and performance aspects in establishing an industrial project.

Provides an engineering reference on the project to the onwers and HMG

Presently performed by

The owners

Local or foreign consultants

Aid Agency

5.2 Typical Manufacturing Industry Project

5.2.1 Background

As an example of a manufacturing industry project the ISC feasibility study report on "A Dry Cell Manufacturing Plant at Kathmandu", has been selected.

The study, completed March 1979, recommends the establishment of a dry cell manufacturing plant with a capacity of 12 million general purpose R-20 batteries per year on a single shift.

The investment is Rs 18,836,000, total labour to be employed 51, the internal rate of return is 38.9% and the undiscounted break-even point 37.5%.

Equipment quotations were obtained from overseas by ISC and a strong recommendation made that the Union Carbide India (UCI) equipment be accepted and fact that UCI participate in the venture to improve the marketin rospects and provide long term technical know-how.

The promotion and development of the project is with NIDC. As at January 1981, NIDC had identified a Nepalese battery wholesaler as local partner and was negotiating with UCI plus Japanese interests for foreign participation with perhaps some NIDC participations in the equity as well as loan funds.

Hopefully therefore within a short time period elements 0 - 2 (Figure 5.1) will be completed and a joint venture company founded and funded. (But for reference it is worth noting that a quotation for equipment had been received in July 1976 whilst the feasibility could not be completed until March 1979 - a period of 32 months, and also that the negotiations for founding the company have not been completed by January 1981 - a further 21 months).

5.2.2 Project Engineering Scope

Based on past practices the process engineering for the dry cell battery factory will be prepared by the foreign partner, UCI, with limited support from Nepalese sources but mainly the local partner, ISC Industrial Estates Division, local building contractors and perhaps some local engineering consultancy. The overall project management is likely to remain with UCI.

Whilst the feasibility study does not specify the source or the exact amounts of project engineering there are some indicators included:

	Rs '000
10% of plant cost for erection and commissioning	742
Project Engineering Cost	75
Indian supervision for six months	100
Initial Technical Assistance	200
	1,197

Not specified in the feasibility study is the engineering cost associated with land development, buildings and civil works. However, these items total Rs 2,810,000 and if 5% is assumed then the engineering cost could be Rs 140,000.

That is approximately Rs 1,337,000 has been estimated or can be foreseen as the likely project engineering expense in the broadest sense. (As a guide to the dimension of this in Nepalese terms this amount approximates the total budget allocation by HMG to all of ISC for one year).

There therefore appears to be both scope for ISC participation and a worthwhile income to be derived.

5.2.3 Possible Role of ISC

Reference will be made in this section of the report to the project engineering network activities as illustrated in Figure 5.1. Figure 5.1 can therefore be left extended for easy reference.

This section describes how ISC can provide both consultative and executive assistance to the project; substituting where possible for the foreign experts (UCI); supplementing and directing Nepalese engineering and contracting; and providing overall project management on behalf of the owners an HMG. Also how in this typical example of ISC Project Engineering Branch can learn through doing.

Reasonable assumptions have been made and are included as to the likely time scale of the project and as to the ISC resources which will be required. Possible organisational relationships have been defined.

5.2.3.1 Network Activities

* Element 2 - 14 "Project Management" (Figure 5.1)

This element is the overall guidance and direction of the project from initial design to commissioning of the plant.

Overall responsibility for the management of the project remains with the owners with heavy dependence upon UCI for the technical advice and decision making.

ISC can provide the Nepalese technical and construction reference.

HMG, possibly represented by NIDC, can assist in legal/administrative matters and in supervision of fund allocation and dispersal.

It is proposed that an overall "Project Management Committee" be formed which will regularly, probably monthly, monitor and direct the project activities. The Chairman will be the Nepalese owner, with all owners represented as members. Also as members will be the UCI nominated Project Officer, the Chief of Project Engineering Branch ISC, and a nominated representative of NIDC Project Implementation and Follow-Up Division.

The Committee will evaluate plans; recommend suppliers, consultants, contractors, and staff; and monitor progress and take action accordingly. The authority of the Committee is that of the individual members.

It is further proposed that an ISC Project Officer be appointed as counterpart to the UCI Project Officer when he is stationed in Nepal and to act on his behalf in his absence.

As will be shown later the project management phase is estimated to last for some 18 months.

* Element 2 - 3 "Process Design"

The process has been described in the feasibility report and is inherent in the equipment supply quotations. However more detail is required and further confirmation on the production balance and efficiency of the plant as a whole and of individual processes. Further detail is also required an utilities, ancilliary equipment, storage and handling.

It is proposed that this stage be undertaken at the UCI plant in India with the ISC Project Officer present.

A time period of three weeks is estimated for this, in India.

* Element 3 - 4 "Site and Layout Specification"

Based upon the information gathered in 2 - 3 and upon the industrial estate site conditions at Balaju then ISC will prepare the site and layout specifications.

This will include specification and layout of:

- site preparation
- access requirements
- security and fencing
- utilities
- buildings for production, storage, office, laboratory, workshops with provision for expansion.

Drawings will be prepared suitable for consulting engineers or contractors to design for tendering.

ISC will provide one mechanical and one civil engineer plus four draftsmen for this.

The estimated time is four weeks.

* Element 4 - 5 "Civil Engineering Design"

The civil engineering design of the site and buildings will be given to an approved Nepalese civil consulting engineer firm.

They will provide detail design and tender documents suitable for contractors to quote. ISC to advise on suitable consultants. The estimated time is twelve weeks.

* Element 4 - 6 "Mechanical Engineering Design"

The mechanical engineering design, i.e. equipment, will be by UCI.

Specifications of performance, material usage, power and water usage, waste disposal etc. will be provided. Specifications for installation will also be provided. Since the majority of this is available from their quotations a time period of four weeks is allowed.

* Element 4 - 7 "Electrical Engineering Design"

The electrical engineering design of the plant will be given to an approved Nepalese electrical engineering consulting engineer firm.

They will provide detail design and tender documents for establishment for electrical contractors to quote. ISC will advise on suitable consultants. The estimated time is six weeks.

* Element 5 - 8 "Tender for Civil Engineering"

Tenders will be called, evaluated and approved for the civil engineering works.

ISC will provide the basis for evaluation.

The estimated time is eight weeks.

* Element 6 - 9 "Tender for Mechanical Engineering"

There are two parts to this:

1. the tendering for equipment

2. the tendering for installation.

Tenders will be called, evaluated and approved for the mechanical engineering requirements.

ISC will provide the basis for evaluation.

The estimated time is eight weeks.

* Element 7 - 10 "Tender for Electrical Engineering"

Separate tenders may be required for equipment, such as transformers, and for installation and wiring.

Tenders will be called, evaluated and approved for the electrical engineering work.

ISC will provide the basis for evaluation.

The estimated time is eight weeks.

* Element 8 - 11 "Supervision of Civil Engineering"

ISC will provide the supervision of the civil engineering contractors. This will require a site supervisor/engineer to check quality, delivery, cost and approve partial payments.

The estimated time is twenty six weeks.

* Element 9 - 12 "Supervision of Mechanical Engineering"

Critical to the plant construction timetable is the delivery of equipment from UCI, which is quoted at 52 weeks. Constant monitoring of this will be required by the ISC Project Officer on behalf of the Project Management Committee.

The installation of the equipment is also critical and will be supervised by ISC. The estimated time is six weeks from receipt of equipment.

* Element 10 - 12 "Supervision of Electrical Engineering

ISC will provide the supervision of the electrical engineering.

An estimated twelve weeks is allowed.

* Element 12 - 14 "Commissioning of Plant"

The commissioning of the plant will be the responsibility of UCI with assistance as necessary from ISC. Preparation of Manuals for operating and maintenance can be a separate ISC Extension Service.

The estimated time is six weeks.

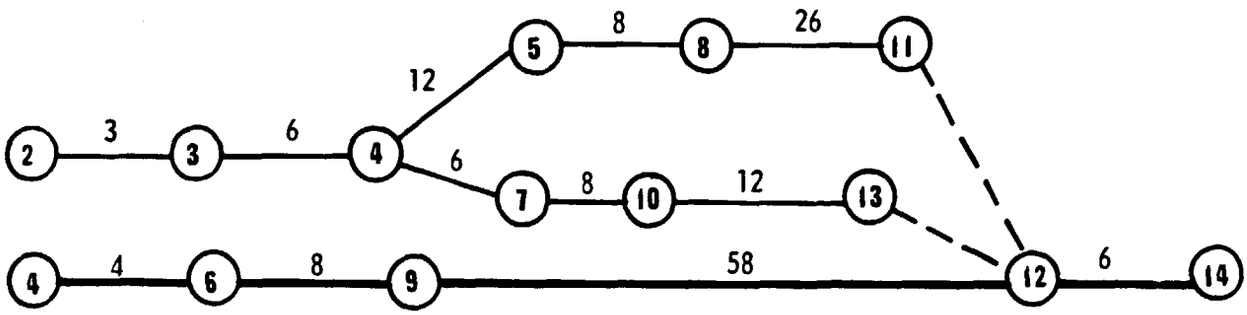
* Overall Time Schedule

Some rescheduling of the various activities appears possible in order to shorten the overall time.

This is shown in Figure 5.2.

Figure 5.2

RESCHEDULED NETWORK OF ACTIVITIES



Overall time 4 + 8 + 58 + 6weeks = 76 weeks

5.3 Typical Service Industry Project

5.3.1 Hotels

The possibility for ISC in project engineering for hotels is probably in the out of Kathmandu tourist regions. In Kathmandu the new hotels are likely to be the four and five star major hotels which will be engineered and project managed by either foreign firms or the already established larger Nepalese private firms. Since ISC has no expertise comparable it would be difficult to gain acceptance in this.

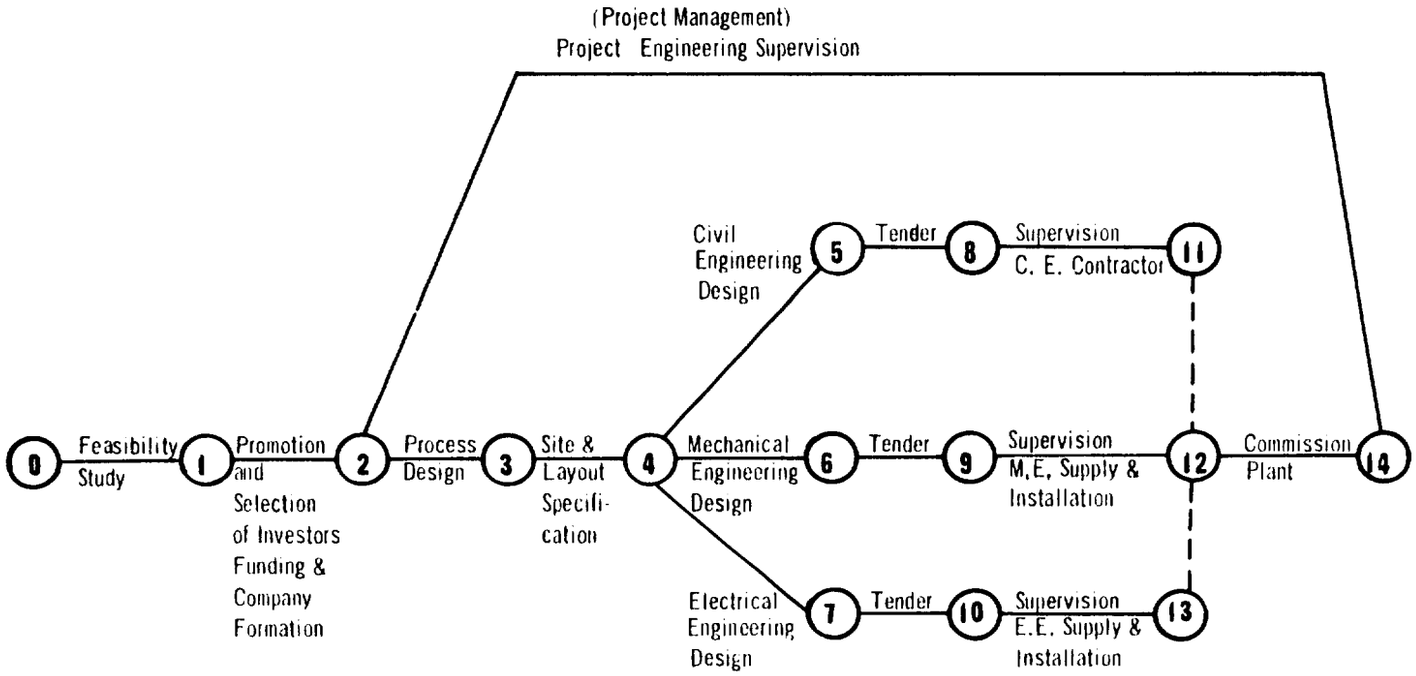
Outside Kathmandu, Nepalese investors could benefit from the professional support of ISC.

The role would be primarily of project management entailing assistance in the selection of the design engineers and contractors plus planning and supervision of the construction and fitting. Also overall cost and time control to meet budget projections.

Since ISC has considerable experience in the preparation of data for tourism and in the preparation of feasibility studies for hotels it is a natural transition, as experience in project management develops, for ISC to contribute.

The activities are similar to those outlined in Section 5.1 with the addition of furniture, furnishings and fittings being considered under the broad categories of activities 4 - 6, 6 - 9, 9 - 12, mechanical engineering. Also architectural aspects would play a large part in activities 3 - 4, 4 - 5, 5 - 8, 8 - 11, layout and civil engineering.

Figure 5.1



6. DEVELOPMENT STRATEGY

6.1 Role of the Industrial Services Centre

ISC is in a position to forward the development objectives of Nepal through assisting industry in project engineering and project management.

The role for ISC in this will be initially by consulting but ultimately as competence is gained by accepting executing responsibility for project planning, construction and commissioning.

In particular, ISC can provide the government support and liaison to optimise the Nepalese engineering participation both through its own resources and also through greater involvement of private and government Nepalese services. A listing of suitable firms should be developed and maintained. Refer Attachment 6.

Also, ISC can provide the international linkage from which foreign project engineering services can be sought and joined in consortium arrangements, and Aid requested as necessary.

Finally, ISC can spread the knowledge and experience gained throughout Nepal by example and by formal training schemes.

In all of these ISC should continue to be a commercially oriented enterprise seeking profits from its services so as it set an example and also so as not to give unfair competition to Nepalese private engineering firms.

6.2 Marketing

There are two main market opportunities:

1. Industrial investment projects - manufacturing and processing

2. Service investment projects - hotels.

The marketing steps for both are similar and are:

1. Identify prospect

2. Present proposal

3. Conduct general promotion activity.

6.2.1. Identify Prospect

The main sources for prospective projects are the development plans of NPC and the Department of Industry, the loan and feasibility requests of NIDC, and the register of studies of ISC. Bulleti newspapers, Aid news releases, journals etc. may indicate c prospects.

6.2.1.1 ISC will establish and maintain a monitoring system on the status of prospective projects and of the key client personnel involved.

Refer Attachments 3 and 5 for possibilities and Attachment 8 for typical file.

An officer of ISC should be nominated instead to maintain this file.

At regular meetings, say every two weeks, the Division Chief and Head of Branch should review this file and initiate future actions.

6.2.1.2 Minutes of this review meeting will be kept, indicating action required and the responsible person.

6.2.2 Present Proposal

6.2.2.1 As a prospective project approaches fruitation then ISC will prepare a presentation to the interested parties, e.g. the owners, HMG.

This presentation, which at the initial stage may not have to indicate a written proposal, will outline the activities that ISC can provide, the benefits to the client from the use of ISC, a description of the competence of ISC in this field and the timing, staffing and cost likely to be involved.

6.2.2.2 For each worthwhile prospect ISC will prepare in advance a written proposal to ensure that all points are covered before meeting with the client.

Any presentation by ISC personnel will be reviewed by the Division Chief and Head of Branch before meeting with the client. Critical attention will be given to clarity, completeness and benefits as likely to be seen by the client.

The reaction of the client may include objections to the use of ISC. These objections are likely to be on the capability of ISC to assist, the cost of ISC services, or that the client with his foreign partner can handle the project without ISC assistance.

These objections should be anticipated and be capable of being answered in a factual manner by listing the benefits of using ISC services.

Also the client may suggest a delay in making a decision. This is known as "stalling" and a stall is a common situation. The stall may be reasonable as when all the interested partners are not present but is usually an emotional reaction to having to make a decision. Again ISC should anticipate and have answers for a stall in advance of the client meeting - including ensuring that all interested parties and decision makers are present.

The full value of the preliminary meeting with the ISC Division Chief is as a rehearsal including likely objectives and stalls, and their answers.

6.2.2.3 A report and review will be given for inclusion in the prospect file after each meeting with the client.

A general statistical record can be kept of the "success rate" of proposals; the remaining prospects, their work content and value; and the time for decision making. This will progressively indicate the possible future work load for the Branch.

6.2.3 General Promotion Activity

It is in the interests of Nepal and of the Nepalese Government and engineers that Nepalese project engineering be developed. Whilst this is generally known there is a need for continuing promotional activity to create and maintain an atmosphere where Nepalese project engineering is sought.

The actions of the Department of Industry, of ISC and of NIDC in particular should be directed towards this promotion. Also the actions of other interested government departments, of the various institutes of engineering, consulting, contracting and of the Aid agencies should be guided with information and material to further promote Nepalese project engineering.

Initially at least, much will depend on the confidence placed in ISC capability. Every project must be successful and every success must be broadened in the widest manner.

Full recognition must be accelerated to other Nepalese contributors to the success - the owners, the private Nepalese consulting engineers and contractors, etc. Also to the benefits gained from technology transfer from foreign experts, partners and suppliers by the joint project engineering approach.

Because of the importance of this promotion we propose as follows:

6.2.3.1 We recommend that the Division Chief of the Industrial Projects Division of ISC personally arrange and co-ordinate the promotion activities for project engineering.

In this he will liaise with other government bodies and with various associations and will fully utilize the Promotions Sections of both ISC and NIDC. Talks, news releases, tours, etc. will be arranged and approved by him.

6.2.3.2 A Promotional Report will be prepared each month listing the promotional activities undertaken and planned. This report will be circulated to the Directors and Division Chiefs of ISC.

6.2.3.3 It should be noted that each advertisement placed seeking participation of Nepalese engineers and firms is a project engineering service represents a most powerful promotion of the concept of Nepalese independence.

6.3 Recruitment, Training and Motivation

6.3.1 Recruitment - Manufacturing Industry Projects

At present the Project Engineering Branch comprises one Branch Chief plus three professional engineers. They are supported as necessary by clerical, accounting and transport facilities. Other ISC engineers can be seconded as required.

The dilemma is whether to recruit in advance of actual project needs and thereby have under-utilised capacity or to wait until a job is received, or reasonably foreseen, and then seek staff, with perhaps delays involved.

A compromise would be to identify suitable applicants and then recruit on either a contract or permanent basis as work develops.

It is this approach we recommend.

6.3.1.1 We recommend that the Project Engineering Branch develop and maintain a file of potential specialist individuals and firms to meet the likely future needs indicated from the Job Prospects File (Refer Attachment 8).

This confidential listing should include individuals from within ISC or other government departments and bodies as well as those from private industry.

In the listing ISC should evaluate and rank past experience and bio-data, note likely salary or fee rates, their availability at short notice, and their possible secondment on a project basis only.

Some specialists are known to be needed for any project and are missing from ISC. In particular detail and design draftsmen.

6.3.1.2 We recommend that the Project Engineering Division establish a drafting office immediately with two mechanical and two civil engineering draftsmen. Space and drafting facilities will be required.

Immediate work would include the preparation of detail material for submission to potential clients and for general functional purposes.

The growth in numbers and the Project Engineering Branch will depend upon the projects received. However it appears from the typical manufacturing example (Section 5.2) that a project could require the equivalent of two engineers full time for a period of eighteen months.

With this yardstick, and allowing some reserve for specialities, absences, etc. a target for growth could be:

Year 1	4 - 8 engineers
Year 2	8 - 12 engineers
Year 3	12 - 14 engineers
Year 4	14 - 16 engineers
Year 5	16 - 18 engineers

Suitable organisation structuring would be required as regards project supervisors from within the engineer force.

Matching with this could be growth in drafting services of probably the same order of numbers.

Also clerical, accounting, support rising to 10 staff over the five year period.

Therefore a possible growth in ISC Project Engineering staff to approximately 46 is estimated over 5 years. No estimate has been made of the multiple effect through ISC project engineering on Nepalese private consulting engineers but an assumption of 2 - 3 times seems reasonable, i.e. 100-150 engineers and staff.

6.3.2 Recruitment - Hotel Projects

It is assumed that ISC will not seek to participate in major Kathmandu hotels but will concentrate on smaller tourist hotels.

A typical hotel project could therefore require from ISC the following:

Project Manager	1
Civil Engineer	1
Electrical Engineer	1
Site Supervisors	3
Draftsmen	2
Clerical, accounting	3
Purchasing	1
	12

A hotel project could continue for 12 months and assuming two such projects per year the ISC staffing would be 24. The majority of the design would be by Nepalese private firms and a multiplier effect of say 3-4 could apply, say 72-96 personnel.

6.3.3 Training - Manufacturing Industry Projects

6.3.3.1 Overseas Training

Overseas training would be primarily directed to ISC participation with overseas private firms in the design and planning of individual industrial projects.

Also in attending appropriate seminars and short duration conferences on suitable topics such as project management, construction techniques, machine design etc. This could have the added advantage of facilitating the presentation and promotion of the Nepalese viewpoint and particular problems.

6.3.3.2 Learn Through Doing

The emphasis should be on ISC engineers developing by working with or for local and foreign experts on Nepalese projects. Refer Attachment 4 for an opportunity which exists. Where the ISC expertise is not adequate for commercial venture then either a reduced fee, or in the extreme no fee, should be charged for their services.

At all stages ISC should be gaining from each project and have a counterpart seconded for each foreign or local specialist.

ISC personnel should seek the maximum responsibility for their actions. That is they should be striving to the limit of their competence and be accepting responsibility and authority accordingly. In this ISC as an organisation will similarly accept responsibility which can include financial responsibility for errors or omissions.

6.3.3.3 Training Courses and Briefing Sessions

There are some matters which can be taught by internal training courses, by ISC staff or other specialists. This internal training should be regularised for full dissemination and can be both by the Project Engineering Branch and the Training Branch.

Such courses could include:

- Industrial selling
- Project costing
- Project control (including consulting project control)
- Supervision
- Production Management
- Network planning
- Maintenance Management
- Accounting and audit practices
- Operator training
- Report writing
- Safety
- First Aid, etc.

Briefly sessions can be given by specialists on such topics as:

- Contract Law
- Labor regulations
- Industry growth plans
- Company Law
- Investment procedures
- National Standards Codes, etc.

It should be recognised that with the projected growth in the Project Engineering Branch that the newcomers are, firstly, not all similarly trained as the existing staff and therefore can gain from background and specialised courses and, secondly, that they also have something to contribute to the knowledge of the Branch.

Also, with the planned expansion, that there will be excess capacity for a period to come and that this extra time can be best utilised by training.

6.3.4 Training - Hotel Projects

All the comments on Training - Manufacturing Industry Projects 6.3.3 are valid for hotels.

In addition the whole emphasis of training for hotel projects will depend upon working in consortium with foreign firms. It is from these that all training and development must come.

6.3.5 Library

The Library at ISC is a source of reference and training material for both the government and the private sector.

Attachment 10 shows the available reference books and indicates some gaps that should be filled.

6.3.6 Motivation

There are restraints on the motivation for ISC individuals who would seek to progress in project engineering:

1. Promotion is to the generalist administrator rather than the technical specialist. Beyond the level of Senior Officer the categories of Branch Chief and Division Chief indicate that the broad management role predominates over a specialty such as mechanical engineering design.

2. Promotion can be for the non-risk taker whereas each project will involve clear cut responsibilities and risks.

3. For Officers and above there is no overtime. Therefore, for example, a site project officer who would be expected to be available beyond the normal government working hours in order to supervise construction would have no financial reward for his added time. He may in fact miss his government transport services to and from home.

4. For government professional staff - a strong motivation is the possibility of overseas study. Trips rather than achievement become the goal.

5. Financial or other rewards are not directly related to performance.

The compensating factors such as interesting, satisfying work and a sense of achievement can sustain at the beginning but will be eroded unless reinforced with more positive rewards. Successful goal-oriented individuals otherwise will have the options of leaving government for the private sector (which of itself is not a national loss) or of seeking employment overseas with a resulting brain-drain.

The overall National solution to the above is beyond the scope of this report. However, consideration should be given to project allowances and other incentives based on project responsibility and performance.

6.4 Time Scale

The time period considered for the promotion and development of ISC project engineering is the next five years - 1981 - 1986.

In part this is because it is a convenient span as it covers the Sixth Five Year Plan of HMG and allows for further consideration before the development of the Seventh Five Year Plan.

But mainly, five years represents a reasonable time for further industralisation in Nepal (on which future projects will depend) and for ISC to promote its activities and develop a confident competence in project engineering.

The manpower estimates of section 6.3.1.2 for manufacturing projects show that some 46 ISC project engineering staff can be required in that period, and if ISC decide to pursue hotel projects then a further 60 personnel could be required (section 6.3.2).

From the existing base of four engineers plus general ISC support even the manufacturing project represents a worthwhile but not impossible target. also the multiplier effect to Nepalese private firms is significant.

It is self-evident but warrants repeating - the whole success of project engineering depends upon having industrial projects in Nepal, and the example of the dry cell battery manufacturing plant which has taken four years to reach a founding stage is unfortunately typical and does not encourage confidence in the near future demands for project engineering.

However there are signs of a breakthrough with industrial sub-sector planning and continuing feasibility requests. Also the reconciliation of recent political differences within the country will encourage investors and investment.

The next major factor affecting project engineering growth in Nepal will be the ability of ISC to promote the concept as a whole and to sell individual project services. In this they will depend upon HMG departments and NIDC for full, and it may initially appear unjustified, support. But the success or failure of project engineering will rest with ISC and its officers.

The recruitment and training of suitable ISC personnel is within the capability of ISC - they have certainly achieved similarly in other divisions and branches.

And the performance of progressively more responsible and complex project engineering tasks will follow.

In the light of the above preamble we project the major efforts of ISC over the next five years as follows. Refer Figure 6.1.

Figure 6.1

Major Efforts of ISC 1981 - 1986

_____ signifies full effort

------ signifies continuing effort

	1981	1982	1983	1984	1985	1986
Promotion of the concept of Nepalese project engineering	———	----	----	----	----	----
Identification of individual projects	____	----	----	----	----	----
Identification of suitable individuals and firms to work with ISC	____	----	----	----	----	----
Selling of individual project engineering services	———	———	———	———	———	———
Providing project engineering services	———	———	———	———	———	———
Training ISC staff	———	———	———	———	———	———
Reporting and Controls	----	----	----	----	----	----

6.5 Controls

It is intended that ISC operate its Project Engineering Branch as a profitable as well as a technically competent service to industry. To ensure profitability there are several key factors:

6.5.1 Sufficient Work Activity

The generation of a regular work load is a primary responsibility of management.

6.5.2 Accurate Estimating of Costs

The costs of labour, travel, allowances and expenses require specification for quoting purposes and also for control. These are forecast in budgets for the year ahead.

6.5.3 Regular Reporting of Progress and Costs

Reporting of time usage should be on a daily basis separating into "chargeable" and "non-chargeable" with a job numbering and expense numbering system.

Monthly reporting on costs then follows.

6.5.4 Regular Billing to the Client

Billing arrangements are preferably agreed with the client prior to commencement. But in any event billing should be regular, preferably on a monthly basis.

6.5.5 Collection of Fees and Expenses Requires Attention

Control of accounts is required.

6.5.6 An Overall Performance Indicator should be Maintained

A normal performance indicator for each job in progress, and for the whole Department is:

$$\frac{\text{Chargeable Time}}{\text{Available Time}} \times \frac{\text{Billed Time}}{\text{Chargeable Time}} \times \frac{\text{Collected Time}}{\text{Billed Time}} \times 100\%$$

Available time being the normal working hours per month. Chargeable time is the time chargeable to the job. Billed time is the basis for billing the client. Collected time is the equivalent amount received from the client.

A good engineering practice would budget for:

$$\frac{\text{Chargeable}}{\text{Available}} = 90\%$$

$$\frac{\text{Billed}}{\text{Chargeable}} = 90\%$$

$$\frac{\text{Collected}}{\text{Billed}} = 100\%$$

Performance 81%

At the beginning the ratios are likely to be:

$$\frac{\text{Chargeable}}{\text{Available}} = 60\%$$

$$\frac{\text{Billed}}{\text{Chargeable}} = 80\%$$

$$\frac{\text{Collected}}{\text{Billed}} = 80\%$$

Performance 38.4%

That is, for every hour spent on the payroll only 0.384% hours (23 minutes) will be paid for by the client. Unless the fee rate is 3 times the salary rate (plus allowances) then ISC will lose money.

It is this overall control which requires constant attention.

6.6 Aid Assistance

There are some general areas where Aid Agencies can assist HMG in developing project engineering. Broadly these are:

6.6.1 Assist Investment in Projects

The present obstacles to investment include:

- undue delays in processing investment applications and requests for loan funds
- shortages and delays in supply of raw materials
- uncertain electricity and fuel supplies.

These obstacles are both known and being acted upon by HMG and various Aid Agencies but are included in this report in the context that by assisting industrial projects to be developed there is an immediate development of the market for project engineering.

6.6.2 Provide Nepalese Participation in Aid Projects

Aid, including bilateral Aid, provides the major industrial projects for Nepal - textile mill, cement plants, foundry, etc. In each of these there are Nepalese counterparts usually from the industry or Ministry concerned. Also there are Nepalese private firms participating as in building and contracting.

However there is still scope for further Nepalese participation, both government and private, in the project engineering aspects.

This Nepalese participation may in some respects duplicate the foreign expertise but even if as a training provision would strengthen the Nepalese experience and also would provide a source for the next similar project, e.g. two more spinning mills are planned over the next 5 years.

A review by each Aid donor prior to commencement of any project would indicate the opportunities and if required ISC could assist in the selection of suitable government or private participants.

More specific areas of possible Aid Assistance are:

6.6.3 Provision of ISC Project Engineering Office

The ISC Project Engineering Branch requires facilities:

- One project vehicle
- Four drafting machines, stools and lamps
- One plan printer
- Two plan filing cabinets
- Three four-drawer cabinets
- One typewriter
- One photocopier

Also assistance can be provided for local project expenses such as office, travel and project payments.

Total Estimated Cost US $12,000.

6.6.4 Provision for Overseas Conferences

Assuming three seminars/conferences in the first year being in the Region and of ten days duration the estimated cost is US $6,000.

Per Seminar

Fares	US $ 600	
10 days accommodation and per diem	1000	
Conference fee	200	
Contingency 10%	180	
	US $2000	Total for 3 Conferences US $6000

6.6.5 Aid Experts

Aid exports are required to assist in establishing and developing the ISC Project Engineering Branch plus technical support for particular industrial investments.

6.6.5.1 Project Engineering Development Expert UNIDO

The Project Engineering Development Expert will work with the ISC Project Engineering Branch in gaining project engineering work, recruiting suitable staff and training them, classifying Nepalese consultants and contractors, controlling projects, and monitoring and reporting on the Branch progress.

Since the project engineering area most in need of support in Nepal is mechanical engineering he will be strong in this field. He preferably has worked in a consulting engineering firm specialising in process engineering and also has line experience in construction and project management and professional office development. His reputation will be such as to assist ISC in gaining work.

6.6.5.2 Technical Support Experts UNIDO

The variety of project engineering in Nepal will include all industry including hotels. There will therefore be need for individual experts who are specialists in particular fields.

These individual specialists will be required at short notice and for short duration, say one to four months. For longer periods the need will probably be met by the investor or Aid Agency involved and are therefore not foreseen as part of the ISC support.

Over the next two years there could be need for six such specialists of say 2 months average duration. That is a total of 12 man months of specialist support at an estimated cost of US $80,000.

6.6.6 Pilot Factory Project UNIDO

A pilot factory project for industry could provide both a valuable training example for ISC Project Engineers Branch plus a lasting facility for Nepalese industry development.

To elaborate on this, the UNIDO foundry is being installed as an example of modern foundry technology and as a training example for other Nepalese foundries. (As mentioned in section 6.6.2 it could also be used as a training example for project engineering if desired).

If for example, an ancilliary factory was provided by UNIDO to use part of the output from the foundry for production purposes this factory could also serve as a project engineering exercise and have the longer term advantage of being a model for modern production techniques and management.

Continuing this example, a suitable factory could be for water pump, water meter, leading to water turbines, water fittings, etc., production which uses predominantly castings. It is capable of displaying modern metal techniques and management techniques, and serves a useful National purpose which can be duplicated elsewhere in the country by government or private enterprise.

The equipment to be used in such a factory is basically standard, i.e. no unique design of individual pieces of equipment is required. But the selection and integration of equipment for machining, assembly and finishing would further develop the mechanical capability of Nepal if prepared in Nepal in conjunction with the UNIDO Project Engineering Development Expert.

6.6.6.1 We therefore propose a three phased approach by UNIDO using ISC services.

* The first phase would be the investigation of the suitability and feasibility of such a plant (or similar plant).

* The second phase would be the project engineering design and selection of processes and equipment.

* Finally the project management of the construction, installation and commissioning of the plant using the maximum of Nepalese resources.

The plant would all be the property of HMG, possibly under the Department of Industry and Trade, and would serve for training as well as production.

Preliminary estimates of the costs are:

Phase 1	Feasibility study Rs 30,000
Phase 2	Project engineering design (in conjunction with the UNIDO Export) Rs 100,000
Phase 3	Construction and commissioning US $200,000 (Subject to product range)

6.6.7 Library Reference Aid

As mentioned in section 6.3.5 there is a need for further library reference material. A listing of immediate needs is given in Attachment 10 and further work on the Documentation Study will undoubtedly indicate more.

These books can be provided by UNIDO or bilateral Aid at an estimated cost of US $500.

6.7 Government Assistance

The contribution that HMB can make to the development of project engineering services in Nepal is as follows:

* Assist and encourage industrial investors. Whilst this is Government policy the performance in recent years has not developed suitable projects for project engineering.

* Require that Nepalese project engineering services participate to the maximum in Government Aid and private industrial projects.

* Provide any necessary subsidies and risk insurance to ISC during the initial stages.

* Provide a motivational environment through career and financial incentives for ISC and other government staff to seek project work as distinct from desk activities.

7. CONCLUSION

There are four major questions to be answered.

1. Can ISC undertake turn-key projects currently performed by foreigners?

   The answer is no - and it is unlikely that they will be in a position to do so for other than simple projects within the next ten years.

2. Can ISC do project engineering in competition with foreigners?

   The answer is yes with some exceptions - by drawing upon existing Nepalese expertise and by developing this further both within ISC and internally. The exceptions are the very specialised activities of project engineering such as machine design.

3. Is there a market for project engineering for ISC?

   The answer is yes - provided HMG acts to promote Nepalese industries and industry services and ISC takes the initiative to generate sufficient activity to be completely economic.

4. How can ISC develop its project engineering?

   By working in collaboration with foreign Nepalese experts on Government, Aid and private projects, progressively taking more responsibility. The time span is likely to be five years.

Overall, the initiative is with ISC to generate work; to secure and develop staff through working on actual projects; and to control the overall performance and profitability of the Branch.

HMG and Aid Agencies can assist and in some respects are vital in this but the initiative and the follow-through is with ISC.

ATTACHMENT 1

His Majesty's Government Officers
and Other Officers Visited

Department/Agency	Officer	Title
Department of Industry and Commerce	Mr. A.N.S. Thapa	Joint Secretary - Industry
Industrial Services Centre	Mr. G.B. Shah	Acting Executive Director
	Mr. T.K. Sharma	Division Chief
	Mr. K.P. Sharma	Division Chief
	Mr. G.D. Pandey	Division Chief
	Mr. T.B. Karki	Division Chief
	Mr. D.B. Karki	Branch Chief
Nepal Industrial Development Corporation	Mr. R.C. Pyakural	Division Chief
	Mr. J. Melford	Resident Representative
	Mr. J. de Boeck	Junior Professional Officer UNIDO
International Bank for Reconstruction and Development	Mr. R. Abbott	Representative
International Labour Organisation	Mr. F.W. Mahler	Manpower Expert
Australian Development Assistance Office	Mr. J. Geissler	Representative
Industrial District Hetauda	Mr. S.P. Joshi	Manager
Birgunj Sugar Factory Ltd.	Mr. S.D. Tuladhar	Divisional Chief
Hetauda Textile Industry Ltd.	Mr. S.B. Pandey	Executive Chairman
Nepal Consulting Assoc.	Mr. K.K. Shrestha	Chairman

Industrial Services Centre
List of Studies
(November 1974 to July 1979)

A. Feasibility Studies

	Study	Year
1.	Agricultural Lime	1975
2.	Cold Storage	1975
3.	Five Star Hotel	1975
4.	Three Star Hotel (vegetarian)	1975
5.	Hotel	1975
6.	Khandsair (Brown Sugar)	1975
7.	Paper	1975
8.	Paper	1975
9.	Rice Mill	1975
10.	Auto, Repair Workshop	1976
11.	Boating Service	1976
12.	Brewery	1976
13.	Cotton Textile	1976
14.	Khandsari	1976
15.	Khandsari	1976

ATTACHMENT 2

Location	Sponsoring Party	Present Status (as per ISC information)
Kathmandu	A.L. Factory	Production started
Butwal	Pvt. Client	Client dropped the project after ADB/N took similar project
Kathmandu	Pvt. Client	Project dropped
Kathmandu	Pvt. Client	Not Feasible
Dhankuta	Pvt. Client	Project dropped by client
Dhading	ISC	Construction Completed
Birgunj	Pvt. Client	Client still considering the project
Nepalgunj	NIDC	Project dropped
Tikapur	Pvt. Client	Under Construction
Far Western Region	NIDC	Not feasible
Pokhara	NIDC	Being finalised by NIDC
Kathmandu	Pvt. Client	Under construction
Pokhara	Ministry of Industry and Commerce (HMG)	Report submitted to the party
Sunsari	Pvt. Client	Construction almost completed
Nawal Parasi	Pvt. Client	Construction almost completed

16.	Mechanical workshop	1976
17.	Handmade Paper	1976
18.	Paint, Varnish & Resin	1976
19.	Pesticides	1976
20.	Potable Alcohol	1976
21.	Modern Rice Mill	1976
22.	Modern Rice Mill	1976
23.	Modern Rice Mill	1976
24.	Modern Rice Mill	1976
25.	Modern Rice Mill	1976
26.	Sherpa Hut	1976
27.	Slate	1976
28.	Solvent Extraction	1976
29.	Stone Crushing	1976
30.	Industrial District	1976
31.	Solvent Extraction	1976
32.	Solvent Extraction	1976
33.	Stone Crushing	1976
34.	Sugar	1976
35.	Sugar	1976
36.	Vegetable Ghee	1976
37.	Wood Seasoning	1976
38.	Wood Seasoning & Impregnation	1976

Eastern Region	NIDC	Not feasible
Various Hill Regions	DCVI/HMG	Pilot project under construction
Kathmandu	Pvt. Client	Loan application being considered by NIDC
Kapilvastu	Pvt. Client	Production started
Birgunj	Birgunj Sugar Factory	Under construction
Birgunj	N.P.R.E. Co.	Not known
Bhairahawa	L.P.R.E. Co.	Not known
Mechi Zone	M.P.R.E. Co.	Not known
Kanchanpur	M.P.R.E. Co.	Not known
Chitwan	Pvt. Client	Construction starting soon
Lukla	Sherpa Co-Operative Soc.	Established
Bandipur	NIDC	Production started
Hetauda	Pvt. Client	Under construction
Butwal	NIDC	Production started
Panchkhal	ISC	Draft report completed project not considered due to cost factor
Dhangadi	ISC	Production started
Nepalgunj	ISC	Report being reviewed
Pokhara	NIDC	Under construction
Kailali	ISC/Triveni. Eng.	Project dropped
Rautahat	Pvt. Client	Project dropped
Hetauda	Pvt. Client	Under construction in HID
Butwal	NIDC	Loan being considered by NIDC
Hetauda	NIDC	Loan being considered by NIDC

39.	Aluminium Utensils	1977	Nepalgunj
40.	Bakery	1977	Chitwan
41.	Bakery	1977	Kathmandu
42.	Bakery	1977	Pokhara
43.	Bicycle Assembly	1977	Kathmandu
44.	Ceramics	1977	Central Region
45.	Cotton Textiles	1977	Butwal
46.	Diamond Cutting	1977	Kathmandu
47.	Fruit Canning	1977	Dharan
48.	Furniture	1977	Eastern Region
49.	G.I. Pipe	1977	Narayani Zone
50.	Hoisery & Knitwear (Sub-sector Study)	1977	Different Regions
51.	Khandsari	1977	Kapilvastu
52.	Khandsari	1977	Tikapur
53.	Khandsari	1977	Rupandehi
54.	Medicinal Herbs	1977	Western Region
55.	Metal Craft	1977	Patan
56.	Oxygen	1977	Kathmandu
57.	Printing Press	1977	Kathmandu
58.	Printing Press	1977	Western Dev. Region
59.	Printing Press	1977	Far Western Dev. Region

Pvt. Client	No action taken by the client
NIDC	3 loan applications being considered by NIDC
Pvt. Client	Under construction in PIE
Pvt. Client	Not feasible
Pvt. Client	Not feasible
NIDC	Not feasible
Pvt. Client	No action by the client
Pvt. Client	License issued
NIDC	License issued but project dropped by client
NIDC	Not feasible
Pvt. Client	Not feasible
DCVI/HMG	Pilot project in implementation stage
Pvt. Client	Production started
Pvt. Client	No action by client
Pvt. Client	No action by client
ISC	Preliminary Survey report prepared
NIDC	Being promoted by NIDC
ISC	Not feasible
Nepal Rastra Bank	In operation
NIDC	Not feasible
NIDC	Not feasible

60.	Rice Mill	1977	Janakpur
61.	Rice Mill	1977	Chitwan
62.	Rice Mill	1977	Biratnagar
63.	Paper	1977	Bhairahawa
64.	Solvent Extraction (Raw material and survey)	1977	Eastern Region
65.	Tobacco Processing	1977	Janakpur
66.	Tourist Lodge	1977	Chitwan
67.	Agro-based Industries (General Survey)	1978	Sagarmatha Zone
68.	Bricks & Tiles	1978	Nepalgunj
69.	Coarse Woolen Yarn	1978	Kathmandu
70.	Colour Film Processing & Printing	1978	Kathmandu
71.	Cotton Textiles	1978	Pokhara
72.	Hotel Accommodation (projection)	1978	Kathmandu
73.	Instant Noodles	1978	Pokhara
74.	Presh Mud (fertilizer)	1978	Birgunj
75.	Tobacco by-products	1978	Janakpur
76.	Surgical Cotton	1978	Kathmandu
77.	Drycell Battery	1978	Kathmandu
78.	Electrical Accessories (ACRR Conductors)	1978	Butwal

JP. R.E. Co.	Not known
Pvt. Client	Not feasible
N.P.R.E. Co.	Not known
NIDC	Project dropped because the Chinese Govt. aided project being promoted
Dept. of Ind. HMG	Report submitted
ISC	Negative
Pvt. Client	In operation
Ministry of Ind./Commerce HMG	Study submitted to the Party
NIDC	Being promoted by NIDC
Pvt. Client	In trial production
Pvt. Client	Loan being considered by NIDC
Pvt. Client	Loan being considered by NIDC
Dept. of Tourism/HMG	Study being used as input for tourism policy
Pvt. Client	Loan being considered by NIDC
Dept. of Ind. HMG	Not feasible
Dept. of Ind. HMG	Not feasible
Pvt. Client	Not feasible
NIDC	Feasibility study completed (positive)
NIDC	Loan being considered by NIDC

79.	Feed Meal	1978
80.	Fertiliser formulation	1978
81.	Ginger Processing	1978
82.	Rice Mill	1978
83.	Strip Rolling	1978
84.	Furniture	1978
85.	Handloom weaving (sub-sector Study)	1978
86.	Acetic Acid from molasses	1978
87.	Wood treatment & seasoning	1978
88.	Cotton Spinning	1978
89.	Mosaic Tiles	1978
90.	Aluminium Utensils	1978
91.	G.I. Wire Netting	1978
92.	Glass Sheets	1978
93.	Soyabean Processing	1978
94.	Wooden Parquet	1978
95.	Woolen Industry (sub-sector study)	1978
96.	Cotton Spinning	1978
97.	Jute Carpets	1979
98.	Chalk, Safeda and precipirate calcium	1979

Dharan	NIDC	Not feasible
Bhairahawa	Pvt. Client	License Issued
F.W. Region (Nepalgunj)	NIDC	Project found feasible
Kailali	Pvt. Client	Draft feasibility study
Eastern Region	Pvt. Client	Not feasible
Kathmandu	Pvt. Client	Market study completed
Different Regions	DCVI/HMG	Report completed
Different Regions	NIDC	Draft feasibility study (negative)
Dharan and Dhangadi	NIDC	Draft feasibility study completed
Butwal	NIDC	Draft feasibility study (positive)
Kathmandu	NIDC	Draft feasibility study (negative)
Eastern Region	NIDC	Draft feasibility study (negative)
Different Regions	NIDC	Study in preparation
Different Regions	NIDC	Draft feasibility study (negative)
Different Regions	NIDC	Draft feasibility study (negative)
Pokhara	Pvt. Client	Study completed (negative)
Different Regions	DCVI/HMG	Study in process
Hetauda	Pvt. Client	Applied for licence Stuy in preparation
Different Regions	NIDC	"
Narayani Zone	NIDC	"

99.	Occupational Tools	1979	Different Regions
100.	Goat skin processing and glue extraction	1979	Different Regions
101.	Casting and Electro-plating of sanitary fittings	1979	Different Regions
102.	Baby Food	1979	Different Regions
103.	Plastic Injection	1979	Different Regions
104.	Fruit & Vegetable Processing	1979	Different Regions
105.	Steel Fabrication & Erection	1979	Hetauda
106.	Fruit Canning	1979	Homsom
107.	Modernisation of Rice Mill	1979	Bardia
108.	Cold Storage	1979	Dhangadi
109.	Modern Rice Mill	1979	Mahendranagar
110.	Auto Workshop	1979	Nepalganj

NIDC	Applied for licence Study in preparation
NIDC	"
NIDC	"
NIDC	"
NIDC	"
NIDC	Draft feasibility study (negative)
Pvt. Client	Study on going
UNDP	Feasibility study (positive)
Pvt. Client	Positive
Pvt. Client	Study on going
Pvt. Client	Study on going
Pvt. Client	Study on going

ATTACHMENT 3

Industrial Sector Study

Summary and Conclusions

Industrial sectoral Plan Study covers a period of ten years starting from 1980/81 to 1990/91. For the first five years (the period of sixth five year plan) both the physical and the financial programmes have been outlined. Regarding the second five years, the period of seventh five year plan, potential industries as identified has been listed that may require an updating before the commencement of the seventh five year Plan.

The outcome of the industrial programme outlined in the attached pages is the extent of industrialisation attainable in Nepal. The indicators are necessarily growth rate (leading to increasing share in GDP), output (taking care of demand), employment (absorbing the surplus manpower) and structural change (desirable transformation of industrial base).

Industrial situation of the country as discussed in first part of this study report revealed the industrial value added as follows:

	Years	1965/66 Amount	Annual Growth	1972/73 Amount	Annual Growth	1977/78
a)	Organised Mfg.	Rs.89.6m	20%	Rs.332.0m	8.4%	Rs.479.
b)	Cottage Industries	NA		Rs.122.5m	12.4%	Rs. 218.
c)	Total	NA		Rs.444.5m	9.4%	Rs. 698.3

At 100% capacity utilisation total value added as a result of implementation of the proposed investment programme (Rs. 4027.25 million for the 6th plan period 1980-85) will come to Rs. 1201.93 million. The past experience however limits the possible completion of all the projects envisaged in the 6th plan; but, there is sufficient indication that a better industrial approach towards implementation is in the offing. Nevertheless, the phasing of the investment programme over the five years and the optimum production potentiality do indicate less than 100% capacity utilisation within the plan period. The expected value added, taking into consideration the outcome of investment made in later years of fifth plan period, will be an additional Rs. 829.33 million maximum and a minimum of Rs. 600.9 million.

By 1984/85 total value added of the industrial sector would reach Rs. 1527.6 million (organised manufacturing alone accounting for Rs. 1239.3 million) a growth of 12% per annum at constant prices (minimum 9.4%, organised manufacturing alone 10.6%). There has been a reduced growth rate between 1972/73 and 1977/78 as indicated in Table. Again, the industrial sector is likely to gain momentum with the implementation of planned programmes.

The share of industrial sector in GDP was 3.96% in 1977/78 (manufacturing 2.72%) this will increase to maximum 6.58% and minimum 5.60% in 1984/85 at constant prices (manufacturing 4.43%) indicating a rise as against the decrease from 1972/73 to 1977/78.

There will be a substantial increment in output and employment too. The past figures and expected projection (maximum) within the plan period are given below:

	Output	1965/66	1972/73	1977/78	1984/85
a)	Organised mfg.	Rs.507m	Rs.1798m	Rs.2575m	Rs.4237m
b)	Cottage Industries	NA	RS. 304m	Rs. 713m	(The planned outcome added above)
	Annual growth (a)		19.8%	7.5%	7.5%
	Employment				
a)	Organised mfg.	18176ons	49048ons	56340ons	80087ons
b)	Cottage	NS	1040510ons	1033636ons	(The planned outcome added above)
	Annual growth (a)		15.25%	2.75%	5.15%

The change in commodity of industrial output is the other important aspect of industrialization - a phenomenon happening everywhere in the process of development. The industrial structure of Nepal is still characterised by the dominance of primary processing goods although in recent years a number of secondary manufacturing activities have developed. One of the industrial goals for the 6th plan period is bringing about structural change - the possible outcome is presented below:

% Share in value added

Sub Sector	Past 1977/78	Projection 1984/85
Food and allied	51.3	26.5
Textiles and allied	23.01	15.3
Wood Paper Printing	12.84	14.6
Chemicals plastics & Rubber	1.7	4.6
Non metallic mineral	5.9	33.8
Basic metals engineering	4.9	5.1
Others	0.3	0.1
Total	100.0	100.0

From the above it is revealing that the proposed industrial programmes do help in bringing about structural change. Major share from the non metallic mineral is due to the excessive profitability of some of the large scale projects. However, basic metals and engineering sector do not show such increment although there should have been a major upward change. Further exploration is still needed for complete incorporation of this sector. In fact some basic industries had to be omitted due to apparent infeasibility. Similarly, mini oil refinery project which seem to have establishment potential in Nepal as per preliminary study when included after follow up detailed feasibility will no doubt further increase the share of chemicals subsector. The other limitation of the analysis is the exclusion of potential unorganised cottage industries in households as the study is confined to organised industries both cottage and higher scale.

Other important indicators are given below : (Ultimate result of Plan investment only).

1984/85

		Organised mfg.	Cottage	Average Total
1.	Capital output ratio	3.4	1.24	3.35
2.	Capital labor ratio	Rs. 215289	Rs. 9242	Rs. 127000
3.	Value added per worker	Rs. 60753	Rs. 7443	Rs. 38000
4.	% of V.A. to output	49.77	29.21	47.0

Schedule of Recommended Projects and Investment

The details about the promising industries are presented in the next part of the study.

Sixth Plan Period

The following is the compact list of industrial development programmes for the Sixth Plan Period.

	Sub-sector	Total Projects (Nos)	Investment (Rs.m)	Man-power (Nos)	E.Power (Kw)	Output (Rs.m)	Value-added (Rs.m.)
1.	Food & Allied	68	282.97	2202	1845	210.87	57.51
2.	Drink & Tobacco	8	27.93	219	211	27.30	9.03
3.	Textile, Wearing Apparel & Fibres	1384	481.09	13927	5928	346.70	105.78
4.	Wood Paper Pringing	329	696.9	6157	9479	604.2	193.0
5.	Rubber & Plastic	43	35.75	501	703	107.24	18.66
6.	Chemical & Pharm Ceutical*	85	192.10	1652	1795	276.28	67.03
7.	Non-metallic mineral	36	2183.80	5976	27010	847.07	688.56
8.	Metal Processing Products	9	96.22	811	3741	89.02	43.82
9.	Machinery Equipment & Components	12	30.49	218	720	48.66	18.84
	Total	1974	4027.25	31663	51432	2557.34	1201.93
	a) Small to large scale	187	3902.12	18125	48602	2212.34	1101.16
	b) Cottage scale	1787	125.13	13538	2830	345.0	100.77

The schedule of recommended projects do not cover the unorganised household units such as bee keeping, rope and twine, broom, bamboo products, knitting and tailoring, shoes, pots and handtools, crafts, handloom, furniture and joinery on hire basis, bidi, jarda, etc. The uncertainty of production of the resultant low capacity utilisation lead to negative rate of return in these undertakings which are taken up as parttime work either to meet the household requirement or to generate purchasing power for acquiring essentials. It is natural that this sort of thing poses a problem for incorporation in the plan. Nevertheless the financial targets do include the investment for some of these industries.

* In absence of complete study of oil refinery which is scheduled to be undertaken through UNIDO a tentative investment requirement of Rs. 164.40 million (5000 barrels/day) has not been included here but well may have to be added later on.

The breakdown of above figures into public and private sector are as follows:

	Units	Total Invest. (Rs.m.)	Man-power (Nos)	Elect-ricity (Kw)	Output (Rs.m.)	Value added Rs.m.)
Public sector	24	2893	7062	35970	1407	865
Private sector	1950	1134	24601	15462	1150	337
	1974	4027	31663	51432	2557	1202

Public sector investment includes total finance required for undertaking projects ear marked for public sector.

The details of the schedule namely list of the projects, capacity, investment, efficiency score, output, value added are given in the next pages subsector wise.

Out of that the following projects will come under public sector participation either complete holding or major share holding.

S.N.	Project	Unit
1.	Sugar	1
2.	Milk Pasteurising	2
3.	Tannery	1
4.	Paper	2
5.	Industrial Lime	3
6.	Pesticide Formulation	3
7.	Fertilizer Blending	1
8.	Resin & Turpentile	1
9.	Pyrolitie	4
10.	Drugs	1
11.	Cement	2
12.	Magnesite	1
13.	Lead & Zinc	1
14.	Foundary	1
		24

The regional breakdown is subjected to:

a) proximity of market in case the resources are not trying

b) resource centre with consideration of constraints on marketability

c) foot loose industries.

Regional distribution of planned units and investment required are as follows:

	East	Central	West	Farwest
Project units (nos.)	489	558	493	434
Invest. Required (Rs. million)	1271	1680	494	582
of investment	32	42	12	14

The higher outlay for industries in Eastern region is mainly due to large scale cement project and in central region due to Magnesite and cement projects.

Industrial Growth

Growth of industrial sector can be adduced through growth in value added, growth in contributions to GDP, growth in net output and total employment by industrial sector.

On the basis of net industrial output in 1974/75 it implies that annual rate of growth of industrial sector at constant price over 1972/73 to 1974/75 accounted about 3.5 percent and ratio of manufacturing to GDP at 3.12 percent. NPC forecasts of GDP up to 1980/81 assume a 10 percent annual growth rate of organised manufacturing sector. Assessing the present rate of progress in industries sector this growth rate might be difficult to achieve.

With the implementation of proposed industrialisation programme value added in industrial sector would reach Rs. 1,527 million (as against Rs. 698.3 million on 1977/73). This would indicate a maximum likely growth rate of 12% per annum during the sixth plan period. Setting aside provision for under utilisation of capacity and non-implementation factor (50 percent less than that of planned and installed capacity) a minimum annual growth rate of 9.4 percent is likely to result. This would result contribution of industrial sector in GDP to maximum 6.58 percent and minimum 5.60 percent in 1984/85 at constant prices.

Seventh Plan Period : 1985/1990

Considering the possible changes in investment requirement owing to factors such as price escalations, availability of technology hitherto unknown and rescheduling of investment etc. the financial outlay for the seventh plan has been excluded. The physical programmes, however, has been incorporated in the Part IV of this study 'Summary of Subsectoral Analysis'.

Sub Sector : [illegible]
Scale : [illegible]

S.No.	Industry	Capacity	Scale	Units	Unit Investment Total	Unit Investment Fixed	NPV at 10%
1.	Sugar	1250 TCD	Large	1	115.2	108.43	81.85
1.1	Sugar	1000 TCD	Large	1	94.7	89.1	-
2.	Starch & Glucose	20 tons of maize/day	Large	1	15.85	13.58	9.07
3.	Bakery	2000 pcs/day	Small	2	0.89	0.74	1.53
4.	Noodles	1500 kgs/day	Small	1	3.33	2.5	5.75
5.	Animal Feed	3600 MT/yr	Small	2	1.69	0.69	2.41
6.	Ginger Processing(oil extraction)	130 MT of dry ginger/yr	Small	1	2.45	2.00	4.04
7.	Milk pasteurising	2000/Litres per hr	Large	2	12.63	11.12	18.15
8.	Solvent extraction	15 MT of rice bran processed/day	Medium	1	4.95	4.15	6.29
9.	Rice Mill	1 Ton/hr	Small	20	0.32	0.32	-
10.	Oil mill	½ ton of oilseed/hr	Small	20	0.17	0.17	-
11.	Sugar Cane mix	100 Ton of mix/hr	Small	1	2.35	1.95	-

Summary of Table of Industrial Projects (Sixth Plan Period)

Rs. in million. All Current Prices

Economic IRR%	NPV Ratio	Total Investment in Rs.	Total fixed invest in Rs.	Total man power (Nos)	Electricity required (KW)	Total Gross output in Rs.	Total Value added in Rs.	% of gross output	Remarks
21	0.71	115.2	108.43	675	Captive+ 250 kw	70.96	22.93	32.31	
-	-	94.7	89.1	620	Captive+ 200 kw	56.77	18.34	32.3	
19.6	0.57	15.85	13.58	113	700	17.09	3.03	17.7	
32	1.71	1.78	1.48	30	120	2.44	0.56	23	
35	1.73	3.33	2.5	24	40	6.08	0.98	16.2	
33.5	1.43	3.33	1.38	42	80	13.45	1.57	11.7	
30.3	1.65	2.45	2.00	56	60	3.41	0.79	23.2	
32	1.44	25.26	22.23	406	120	25.02	6.27	25	
30.6	1.27	4.95	4.15	52	60	6.27	1.41	22.5	
-	-	6.34	6.34	-	-	-	-	-	Modernization only
-	-	3.32	3.32	-	-	-	-	-	Modernization only
-	-	2.35	1.95	34	30	-	-	-	
Total :		273.92	256.47	2052	1660	201.43	55.88		

S.No	Industry	Capacity	Units	Unitwise Investment		Return on Investment in %
				Total	Fixed	
1.	Bakery	500 pcs/day	10	0.22	0.17	11.1
2.	Noodles	200 pcs/day	1	0.13	0.11	14.6
3.	Animal feed	2500 MT/yr	1	1.17	0.48	36
4.	Chemicals	45 MT/yr	2	0.17	0.11	25.7
4.1	Chemicals	50 MT/yr	1	0.23	0.15	25.7
			15			Total
	All Projects		68			

Industrial Projects
(Sixth Plan Period)

Rs. in million
At Current Prices

Total Investment	Total fixed invest	Total man power	Electricity required in kw	Total Gross Output in Rs.	Total Value Added in Rs.	% of gross output	Remarks
2.16	1.73	100	150	3.07	0.74	24.1	
0.13	0.11	8	5	0.15	0.06	38	
1.17	0.48	18	30	4.67	0.55	11.7	
0.35	0.22	14	-	0.90	0.17	19.3	
0.23	0.15	10	-	0.6	0.12	19.3	
4.045	2.634	150	185	9.387	1.633		
232.97	259.16	2202	1845	210.87	57.51		

Subsector : Drink & Tobacco
Small to big

Summary Table of
Industrial Projects
(Sixth Paln Period)

Rs. in millions
All current prices

S.No.	Industry	Capacity	Scale	Units	Unit Investment Total	Unit Investment Fixed	NPV at 10% (Rs.)	Economic IRR %	NPV Ratio	Total Investment in Rs.	Total fixed invest in Rs.	Total man power (Nos)	Electricity required kw	Total Gross output in Rs.	Total Value Added in Rs.	Total Value Added % of gross output	Remarks
1.	Rectified spirit	750000 LP ltrs/yr	Small	1	1.2	1.01	2.13	27	1.8	1.2	1.01	22	25	5.0	0.75	15	
2.	Beer	10000KL/yr	Large	1	21.7	19.7	16.4	23	0.8	21.3	19.7	73	100	13.58	5.65	-	
3.	Fruit canning	Cider & juice 50 tonch & 40 ton Jam Jelly Marmalade	Small	2	2.04	1.6	2.7	29	1.4	4.08	3.2	78	80	4.68	1.76	38	
				4						26.53	23.91	173	205	23.26	8.16		

B. Cottage

S.No.	Industry	Capacity	Scale	Units	Unit Investment Total Rs.	Unit Investment Fixed Rs.	ROI	Total Invest Rs.	Fixed Invest Rs.	Total manpower Nos	Electricity kw	Total gross output Rs.	Total Value Added in Rs.	Total Value Added % of gross output	Remarks
1.	Soda water	15000 crates/yr	Cottage	1	0.33	0.17	34	0.33	0.17	12		0.76	0.16	22	
2.	Fruit Preservation & canning	200 MT/yr Juice & jam/jelly	"	2	0.15	0.11	23	0.31	0.22	20	4	0.48	0.24	50	
3.	Rectified spirit	10000 ltrs/yr	"	1	0.71	0.37	52	0.71	0.37	14	-	2.8	0.47	17	
				4				1.35	0.77	46	6	4.04	0.87		
	All projects			8				27.93	24.68	219	211	27.30	9.03		

Subsector: Textiles, Weaving Apparel and Fibres

Summary Table of Industrial Projects (Sixth Plan Period)

Rs. in million
All current Prices

S.No.	Industry	Capacity	Scale	Units	Unit Investment Total	Unit Investment Fixed	(%) R.O.I.	Total Investment in Rs.	Total Fixed invest in Rs.	Total man power (Nos)	Electricity required kw	Total Gross output in Rs.	Total Value added in Rs.	Value added % of gross output	Rem rks
1.	Textile Weaving a. cotton	10 looms 1.5mn meters (100 looms)	Cottage Small Large	1100 7 1	.055 2.79 160.00	.038 2.23 128.00		6.00 19.53 160.00	4.20 15.62 128.00	3300 2500 1100	600 2000	110.00	33.00	30%	
2.	Yarn Spinning a. cotton :	10 mn meter/yr 2000 mt/yr	Large	2	90.00	72.00		180.00	144.00	540	2100				
	b. Acrylic	1000 kg/2 shift	Large	1	25.0	20.0		25.0	20.0	150	100	42.6	6.8	16	
	c. Coarse wool	440 kg/shift	Medium	1	5.83	4.25		5.83	4.25	54	100	12.03	1.75	15	
	d. Shoddy	300 kg/day	Small	2	2.29	1.82		4.58	3.64	70	128	5.04	1.27	25	
	e. baby cards	30 kg/day	Cottage	6	0.17	0.14		1.02	0.84	24	-	0.44	0.32	73	
3.	a. Dyeing house	400 kg/yarn day	Small	2	1.28	1.04		2.56	2.03	42	40	3.06	0.39	29	
		100 kg/day	Cottage	2	0.19	0.11		0.38	0.22	38	16	0.48	0.23	58	
	b. W.Process House	205 blankets day 12000 yards of knited wool	Small	2	0.92	0.84		1.84	1.68	40	60	0.99	0.55	74	
4.	a. Acrylic knitwear	3,33	Cottage	6	0.03	0.01	27%	0.25	0.08	34	11.88	0.95	0.24	26%	
	b. Acrylic & Cotton knitwear	10500 pcs	Cottage	2	0.11	0.07	20%	0.22	0.144	16	13.26	0.45	0.14	32.54%	

	c. Acrylic nylon and woollen knitwear	30814 pcs	Cottage	7	0.08	0.02
	b. Cotton knitwear	171900 pcs	Cottage	1	0.32	0.11
	c. Nylon knitwear	527650 pcs	Cottage	2	0.24	0.12
	f. Cotton and rayon knitwear	20700 pcs	Cottage	1	0.32	0.20
5.	a. Woollen carpet	390.32sq.m	Cottage	119	0.06	0.04
	b. Woollen garments	1018 pcs	Cottage	44	0.07	0.05
6.	Ready-made garments for export	17455pcs	Cottage	55	.06	.03
	Total			1363		

36%	.74	0.188	54	13.62	2.58	0.73	28.6%
37%	0.32	0.198	15	10	0.73	0.24	33.93%
28%	0.48	0.242	22	11.8	1.08	0.32	30.13%
37%	0.33	0.200	15	10	0.73	0.24	33.93%
64%	7.01	4.47	3332		33.58	8.36	24.9%
39%	3.19	2.18	352		7.53	2.61	35%
	3.30	1.75	1134	85	30.52	11.79	39
	422.72	333.99	12372	5300	252.83	69.59	30

Other t
Woolen
Hosiery
Blanke
rugs.

Summary table of
Industrial Projects
(Sixth Five Year Plan)

Subsector : Textiles Weaving, Apparel, Fibres Leather

Rs. in million
All current prices

Scale : Small, Medium and Large

S.No.	Industry	Capacity	Scale	Units	Unit Investment Total	Unit Investment Fixed	NPV at 10% (Rs.)	Economic IRR %	NPV Ration	Total Investment in Rs.	Total fixed invest in Rs.	Total man power (Nos.)	Electricity required (kW)	Total Gross output in Rs.	Total Value added in Rs.	Value added as % of gross output
7.	Leather Shoes	150,000 prs/ annum	Small	4	2.39	1.46	5.90	36.5	2.03	11.58	5.85	700	240	25.62	12.16	48
8.	Canvas Shoes and PVC slippers	200000 100000 prs respectively	Medium	3	3.16	2.80	6.04	31.47	1.91	9.48	8.40	44	60	9.72	4.41	45
9.	PVC Slippers	500000 prs/ annum	Medium	2	6.63	5.38	12.63	31.58	1.9	13.27	10.76	34	120	16.20	7.08	44
10.	Leather Tanning(Banga-bari/Hatuli)	720000 sq.ft/ annum	Large	1	25.00	22.00	-	19 (Financial) IRR	-	18.40*	15.40*	39	200	23.52	9.32	40
	Total :			10	37.69	31.64	-	-	-	52.74	40.43	904	580	75.06	32.97	44

* These figures indicate total investments less the amount already spent or expected to spend in the fifth plan period.

b. Scale Sector

Summary table of
Industrial Projects
(Sixth Five Year Plan)

Rs. in million
at current prices

S.No.	Industry	Capacity	Units	Unit-wise Investment Total (Rs)	Unit-wise Investment Fixed (Rs.)	Return on Investment (%)	Total Investment Total (Rs)	Total Investment Fixed (Rs)	Total Man power	Total Electricity required (KW)	Total gross output (Rs.)	Total Value added Rs.	Total Value added % of gross output
11.	Leather [illegible]	[illegible] pcs/ annum	[illegible]	[illegible]	.17	25.31	1.92	1.19	119	42	4.72	1.38	29
12.	Leather coats & accessories	21000 pcs garments (Leather, Jackets, Waistcoats, Belts) and 21000 pcs of accessories per annum	3	1.15	.40	37.53	3.46	1.20	25	6	13.62	1.71	13
13.	Leather [illegible]	3000 pcs/ annum	1	.15	.03	26.23	.15	.03	7		.44	.11	24
	Total		11	1.53	.65		5.54	2.43	151	43	18.80	3.20	
	All Projects		1334				481.09	376.91	13927	5923	346.70	105.73	

[illegible] (Small, Medium, Large)

Summary Table of
Industrial Project
(Sixth Plan Period)

Rs. in Million
all Current Prices

S.No.	Industry	Capacity	Scale	Units	Unit Investment Total	Unit Investment Fixed	NPV at 10% (Rs)	Economic Rate %	NPV Ratio	Total Investment in Rs.	Total fixed investment in Rs.	Total man power (Nos)	Electricity required (kw)	Total Gross output in Rs.	Total Value Added in Rs.	Total Value Added % of gross output	Remarks
1.	Saw Milling	150000 Cft [illegible]	Small	7 new + 3 exp	2.55	1.40	5.56	44.17	2.7	25.5	14.0	304	334	53.1	7.4	14	Electri[illegible] 50[illegible] t Captiv[illegible] generat[illegible]
2.	Wood Seasoning	100[illegible] Cft	Small	4	3.04	1.94	3.29	25.33	1.2	8.2	4.9	40	140	14.9	2.7	13	Out[illegible] units tw[illegible] uni[illegible] t[illegible] h[illegible] v[illegible] capacit[illegible] 50000 [illegible] 2500 [illegible]
3.	Plywood	275[illegible]^2	Medium	1 exp	6.8	5.8	6.19	29.10	1.0	3.4	2.9	76	200	3.0	1.0	33.0	The [illegible] c[illegible]nt[illegible] t[illegible] plan
4.	Splint	30[illegible]0 [illegible]	Medium	1	9.7	3.0	13.22	36.46	1.9	6.5	5.0	60	75	9.8	2.9	30	Contu[illegible] fr[illegible] 5th pl[illegible] period
5.	Writing & Printing Paper	[illegible]	Large	1	127.9	121.0	201.33	34.31	1.9	577.1	521.7	1627	7900	399	125	32	
		[illegible]	Large	1	74.5	70.0											
		1[illegible]	Large	1	43.0	45.0											
		1[illegible]	Large	1	325.7	22[illegible].7											
6.	Printing Press																
	[illegible] /hr	Small		3	1.[illegible]7	1.24	1.67	27.02	1.3	10.9	9.9	280	56	14.6	4.5	31	
	[illegible] p[illegible]r	Small		4	2.90	2.50	4.29	30.31	1.5	11.6	10.0	200	60	14.7	4.6	31	
7.	Pencil	200[illegible] /day	Small	1	1.90	1.2	2.09	31.45	1.2	1.9	1.2	35	25	4.3	0.7	16	
[illegible].	Corrugated [illegible]		Small	1	1.35	0.3	1.92	32.46	1.2	1.8	0.8	35	7	4.5	0.7	15	
9.	[illegible]		Small	1	1.12	0.75	1.99	34.17	1.9	1.12	0.75	63	45	1.7	0.6	35	
10.	[illegible]	[illegible]	Small	1	0.56	0.49	1.01	34.71	1.3	0.56	0.49	8	22	0.4	0.[illegible]	40	

Subsector : [illegible] Paper Printing
B. Cottage Scale

S.No.	Industry	Capacity	Units	Investment Total Rs.	Investment Fixed Rs.	ROI %
11.	Furniture	Rs. 500000	17	0.33	0.23)	31
		" 120000	50	0.13	0.11)	
12.	Joinery	" 500000	50	"	")	
		Rs. 200000	150			
13.	Craft	500 cft input	3	0.29	0.19	27
14.	Handmade Paper	15 t.	6	0.23	0.18	25
15.	Chalk	172500 rkts	3	0.18	0.13	35
16.	Paper bags	1½ million bags	1	0.37	0.33	24
		1 million cups	1	0.14	0.12	22
13.	Index File	50000 Nos	1	0.29	0.24	16
19.	Small Paper	14,000 Kg	1	0.10	0.09	16
20.	Pencil drive	50 [illegible]/hr	10	0.17	0.13	20
			293			
			329			

Total Investment Rs.	Fixed Investment Rs.	Manpower (Nos)	Electricity KW	Output Rs.	Value added Rs.	% of V.A. to output	Remarks
6.61	3.91	826	270	14.5	8.45	58	
36.0	23.0	2177	419	60.0	30.0	50	
0.87	0.57	132	12	1.2	1.0	83	
1.38	1.03	120	67	1.8	0.8	44	
0.54	0.39	54	-	1.3	0.4	31	
0.67	0.33	9	2	1.6	0.3	19	
0.14	0.12	9	2	0.1	0.08	80	
0.29	0.24	6	5	0.3	0.1	33	
0.10	0.09	16	5	0.1	0.05	50	
1.7	1.3	80	-	3.2	0.8	25	
43.3	36.1	3429	732	84.1	42.0	50	
696.9	607.9	6157	9479	304.2	193	3[illegible]	

Sector: Rubber and Plastics
Se l : C tt

Summary Table of
Industrial Project
(Sixth Plan Period)

Rs. in million
All current prices

S.N.	Industry	Capacity Annual	Units	Unitwise Investment Total	Fixed	MOI	Total Investment	Total Fixed Investment	Total Man-power	Electricity	Gross Output	Total Value Added Gross Output		Remarks
				Rs.	Rs.	%	(Rs.)	(Rs.)	(Nos)	KW	(Rs.)	(Rs.)	%	
Rubber														
1.	Tyre Retreading	2500 tyres	10	0.19	0.14	33	1.92	1.38	90	100	7.15	1.15	16.1	
Plastics														
2.	Electric Accessories	30 MT	1	0.83	0.50	43.7	0.82	0.49	29	20	2.40	0.44	18.6	
3.	Cables	25 MT	1	0.71	0.47	27.6	0.71	0.47	15	20	1.80	0.27	15	
4.	Polyster Sheet (Mattress Manf.)	10 MT	3	0.63	0.49	24.5	1.39	1.43	15	30	2.29	0.61	26.6	
5.	Tooth brush	10 MT (714300 pcs)	2	0.29	0.16	41.5	0.59	0.32	14	16	2.00	0.37	18.6	
6.	Plastic Bangles	5 MT (135000 doz)	4	0.21	0.14	25.4	0.86	0.56	24	20	2.16	0.39	18.4	
7.	Fount in Pens & Ball Pen	1000000 pcs	5	0.43	0.13	42.2	2.41	0.92	30	50	9.24	1.17	12.75	
8.	PVC Moulding	24000 pcs	1	0.23	0.16	34.5	0.23	0.16	16	6	0.51	0.16	31.3	
9.	Plastic Film	45 MT	2	0.53	0.20	32.5	0.36	0.40	22	20	2.64	0.37	14	
10.	PVC Granules	600 MT	1	2.70	0.40	43.3	2.70	0.40	19	25	10.45	0.38	3.5	
			30				13.05	6.61	324	307	40.63	5.33	14.2	

Summary Table of
Industrial Project
(Sixth Plan Period)

Sector : Rubber and Plastics
Scale : Small, Medium, Large

Rs. in million
All current Prices

S.No.	Industry	Capacity	Scale	Units	Unitwise Investment Total	Unitwise Investment Fixed	NPV at 10%	Economic IRR	NPV Ratio	Total Investment	Total Fixed Investment	Total man-power	Electricity KW	Gross Output	Total Value Added Gross Output		Remarks
		(MT)			(Rs)	(Rs)	(Rs)	(%)	(%)	(Rs.)	(Rs)	(Nos)		(Rs.)	Rs.	%	
Rubber																	
1.	Camel Back	150 MT	Small	2	1.49	0.75	0.82	22	0.94	2.99	1.51	28	150	6.37	0.82	12.9	
2.	Microcellular Sheets	150 MT	"	1	1.13	0.77	0.86	21	1.	1.13	0.77	21	60	1.53	0.31	19	
Plastics																	
3.	Electric Cables	6 mn mt.	Small	4	2.24	0.36	1.10	21	0.81	8.96	3.46	64	72	38.40	9.10	23.7	
4.	House hold Goods (Buckets, Mugs, Jerry Cans)	50 MT	Small	2	1.44	1.00	1.53	27	1.37	2.89	2.01	16	14	5.23	0.77	14.7	
5.	HDP Pipe	50 MT	Small	4	1.67	1.14	2.36	33	1.82	6.71	4.56	48	100	14.97	1.82	12.15	
				13					Rs.	22.7	12.35	177	396	65.56	12.33		
	All Projects			43						35.75	13.96	501	703	107.24	13.66	17.45	

tor : Chemicals & Pharmaceuticals
le : Small, Medium, Large

Industrial Projects
(Sixth Plan Period)

Rs. in million
All current Prices

No.	Industry	Capacity (MT)	Scale	Units	Unit Investment Total	Unit Investment Fixed	NPV at 10% (Rs.)	Economic IRR %	NPV Ratio	Total Investment Rs.	Total Fixed Investment	Total Manpower (Nos)	Electricity required (KW)	Total Gross output in Rs.	Total Value added in Rs.	Total Value added % of gross output	Remarks
	Pesticide Formulation	300 (Tech)	Medium	3	4.15	3.76	10.64	37	2.62	12.45	11.29	168	210	18.18	6.11	33.6	Only one formulation BHC 10% considered
	Lime (Industrial)	5000 (Hydrated)	Medium	3	6.09	5.87	9.15	28	1.58	18.27	17.61	81	165	14.25	4.24	39.8	
	Synthetic Detergent	300	Small	2	1.19	.71	2.78	39	2.50	2.39	1.43	80	140	9.24	1.44	15.7	
	Paint and Varnish	300	Small	2	2.21	1.69	0.96	16	0.45	4.43	3.39	30	140	13.51	1.55	11.5	
	Calcium Silicate	120	Small	3	0.76	0.67	1.61	33	2.21	2.30	2.02	51	9	3.24	0.95	29.5	
	Resin & Turpentine	Resin 2960 Turpentine =737 KL	Large	2	19.0	16.9		(22.2)		38.0	33.8	224	160	24.0	6.7	28	Cost 50% inflated
	Fertilizer Blending	1st Phase: 6000 2nd Phase 12000	Medium	1	6.0	5.5		(20.0)		6.0	5.5	48	30	26.3	2.84	10.1	Cost inflated 50% without raw material inventory
	Drugs & Medicines	-	Large	1	39.65	75.65				39.65	75.65	343	NA	9.63	32.68	33.8	
				17						173.57	150.70	1075	335	205.51	56.55		
				85						192.10	162.76	1652	1795	276.23	67.03	24.3	
Subject to further study:																	
	Oil Refinery: 5000 barrels/day		Large	1	164.40	120.0	-	(11)	-	164.40	120.0	93	320	618.24	129.26	20.9	

Summary Table of
Industrial Projects
(Sixth Plan Period)

Sector : Chemical & Pharmaceutical
Scale : Cottage

Rs. in million
All Current Price

S.No.	Industry	Capacity in M.T. Per yr.	Units	Unitwise Investment Total	Fixed	ROI	Total Investment	Total Fixed Investment	Total man-power	Electricity KW	Gross Output	Total Value Added		Remarks
				Rs	Rs	%	(Rs)	(Rs)	(Nos)		(Rs)	(Rs)	Gross Output %	
1.	Animal Glue	40	1	0.30	0.22	25	0.30	0.22	16	5	0.39	0.17	52	
2.	Sodium Silicate	900	2	0.29	0.09	28	0.59	0.18	16	20	3.99	0.35	8.8	
3.	Cosmetics	15	3	0.26	0.18	39	0.79	0.45	33	75	3.12	0.56	18.1	
4.	Polishes	7	2	0.21	0.13	24	0.42	0.26	14	20	0.81	0.11	13.8	
5.	Bone Meal	100	10	0.10	0.09	20	1.00	.93	80	100	1.33	0.64	43.0	
6.	Resin adhesive Rubber Latex	100 KL	2	0.58	0.43	30	1.17	0.87	22	80	3.30	0.61	16.1	
7.	Printing Inks	40	1	0.46	0.38	35	0.46	0.38	19	50	1.17	0.36	31.6	
8.	Laundry Soap	200	18	0.31	0.13	23	5.65	3.34	126	-	24.48	2.56	10.5	Fuelwood is used (1336 MT)
9.	Toilet Soap	100	14	0.41	0.25	29	5.73	3.54	112	280	23.63	2.69	11.4	
10.	Silicate/Starch/ Dextrin	50	1	0.19	0.13	32	0.19	0.13	11	25	0.73	0.14	18.3	
11.	Writing Ink	12 KL	10	0.10	0.06	37	1.01	0.61	90	200	4.32	0.93	21.6	
12.	Pyrolytic products	Charcoal -400 MT Oil 325 MT	4	0.32	0.27	52	1.30	1.08	38	5	(2.33)	(1.30)	45.5	
			63				18.68	12.06	577	860	70.77	10.48	14.8	

Summary Table of
Industrial Project
(Sixth Plan Period)

Sector : Non Metallic Mineral
Scale : Cottage

In million Rs.
All current prices

S.no.	Industry	Capacity	Scale	Unit Investment Units	Unit Investment Total	Unit Investment Fixed	ROI	Total Invest	Fixed Invest	Total man-power	Electricity	Total gross output	Total Value Added	Total Value Added % of gross output	Remarks
					Rs.	Rs.		Rs.	Rs.	nos	kw	Rs.	in Rs.		
1.	Glass Beads	36	Cottage	1	0.37	0.18	49.0	0.33	0.18	61	5	1.29	0.47	36	
2.	Slate	25000m^3	"	5	0.40	0.33	22.4	2.03	1.68	215	75	2.18	1.50	68	
3.	Glass Table Ware (expansion)	300 mt	"	1	0.46	0.31	55.4	0.46	0.31	30	25	1.25	0.41	33	
4.	Lime Pozzolana	300 mt	"	6	0.41	0.26	50.5	2.46	1.56	90	150	7.12	1.73	24	
				13				5.30	3.76	396	255	11.87	4.12		

Notes on Projects given on next Page:

1/ Refer "Appraisal of Hetauda Cement Project in Nepal" - Nov 1976, Prepared by Asian Development Bank. The financial internal rate of return is 14.8%

2/ Refer "Indo-Nepal Cement Plant-3000 TPD", Prepared by Engineer's India Limited. Total working capital requirement is Rs. 46.400 million. In this analysis only 25% of working capital as margin money is considered. If whole working capital is considered, the total investment will be Rs. 1192.19 million. When calculating the gross output, it is assumed that cent percent of clinker and 25% of Cement Produced in Nepal will be exported to India and remaining 75% cement will be sold in Nepal Internal rate of return (14%) is also based on some assumption.

3/ Refer Updated Project Report of Kharedhunga magnesite Project-1979, Prepared by Orissa Industries Limited. The total working capital requirement is Rs. 388.121 million but in this analysis 28% of working capital as margin money is considered. The average gross output value is considered. Even so, the profit is extraordinarily high, although the value taken here reflects the market value on the lower side only.

Industrial Projects
(Sixth Plan Period)

Sector : Non-Metallic Minerals
Scale : Small, Medium & Large

Rs. in Million
All Current Prices

S.No.	Industry	Capacity in M.T	Scale	Units	Unit Investment Total Rs.	Unit Investment Fixed Rs.	NPV at 10 %	Economic IRR %	NPV Ratio	Total Investment in Rs.	Total fixed invest in Rs.	Total man power (Nos)	Electricity required kw	Total Gross output in Rs.	Total Value Added in Rs.	Total Value Added % of gross output	Remarks
1.	Cement Rotaries 1/	750	Large	1	738.51	713.51		12.8 (14.8)		738.51	713.51	1350	6750 KVA	206.10	144.72	70	
2.	Cement Rotaries 2/	3000	Large	1	1157.39	1145.8		(14.0)		1157.39	1145.79	1356	16300	423.36	350.63	82.8	
3.	Refractories 3/																
	a) Dead Burnt	30000															
	b) Magnesite Bricks	20000	Large	1	250.66	238.90		(14.9)		250.66	238.90	840	4500	169.53	165.78	97.7	
	c) Talc	10000															
4.	Building Bricks	100000000 pcs	Small	5	2.30	2.0	(2.68)	(25.5)	1.22)	11.50	10.00	390	200	9.00	6.80	64.5	
5.	Stone aggregate	60000m^3	Small	3	2.50	2.20	6.85	42	3.15	7.51	6.61	144	225	8.46	4.77	56	
6.	Stone aggregate	420000 Tons (1 Ton=2Opcs)	Small	1	1.26	0.92	0.90	20	0.8	1.26	0.92	125	10 max	4.70	1.5 (1.10)	32 (23)	Skilled Indi workers cons Skilled Indi workers not considered
7.	Stone		Small	11	1.06	0.88	3.11	(41)	3.27	11.67	9.69	1375	220	13.75	10.17	74	
	a) Stone blocks	10000m^3															
	b) Stone aggregates	100000m^3															
				23						2178.58	2125.43	5580	26755	835.20	684.44		
	All Products			36						2183.80	2129.19	5976	27010	847.07	688.56	81.5	

Summary Table of
Industrial Projects
(Sixth Plan Period)

Sector : Metal & Metal. Products
Scale : Small Medium, Large

Rs. in million
All current Prices

S.No.	Industry	Capacity	Scale	Units	Unit Investment Total	Unit Investment Fixed	Return on Investment in	Total Investment	Total Fixed Investment	Total Manpower	Electricity required in kw	Total gross output	Total Value Added in	% of gross output	Remarks
					Rs.	Rs	%			(Nos)			Rs.		
1.	Lead & Zinc	27000mt	Large	1	64.47	62.46	40	64.47	62.46	500	2800	52.40	33.09	63	
2.	Foundry	1750mt	Large	1	23.50	19.25	14	23.50	19.25	100	660	13.40	5.54	41	
3.	Hand Tools	60mt	Small	1	1.03	0.89	60	1.03	0.89	41	60	1.54	0.68	56	
4.	Nut, Bolt & Screw	876mt	Small	1	1.91	0.93	80	1.9[illegible]	0.93	15	50	7.60	1.85	24	
5.	G.I. Pipe Fittings	600mt	Small	2	1.64	1.20	18	3.24	2.40	120	76	6.24	1.34	22	
6.	Wire, Nails & Barbed wire	480mt	Cottage	2	0.83	0.36	44	1.66	0.72	20	80	6.62	0.86	12	
7.	Builder's hardware (House fittings)	3000 doz	Cottage	1	0.41	0.36	33	0.41	0.36	15	15	1.20	0.24	20	
			Total	9				96.22	87.01	811	3741	89.02	43.82		

Summary Table of
Industrial Project
(Sixth Plan Period)

Subsector : Machinery, Equipment & Components
Scale : Small, Medium & Large

Rs. in million
All Current Prices

S.No.	Industry	Capacity (Per yr)	Scale	Unit	Unit Investment Total	Unit Investment Fixed	Return on Investment in %	Total Investment	Total Fixed Investment	Total man-power	Electricity required	Total gross output	Total Value Added in	Total Value Added % of gross output	Remarks
					Rs.	Rs.		Rs.	Rs.	(Nos)	kw	Rs.	Rs.		
1.	Water meter	6000 Nos	Small	1	0.86	0.59	28	0.86	0.59	25	20	1.96	0.46	24	
2.	F.H.P. Electric motor	2400 Nos	Small	1	0.81	0.64	14	0.81	0.64	18	10	1.20	0.25	21	
3.	Hand pumps	3000 Nos	Cottage	2	0.49	0.36	68	0.98	0.72	28	40	2.40	0.91	38	
4.	Domestic Electric Appliance	6500 Nos	Cottage	1	0.65	0.33	31	0.65	0.33	15	15	0.52	0.32	62	
5.	Hand Knitting Machine	600 Nos	Cottage	1	0.45	0.37	79	0.45	0.37	23	15	0.90	0.52	57	
6.	Simple Machine tools	48 Nos	Cottage	2	0.48	0.44	18	0.94	0.88	28	50	0.86	0.38	44	
7.	Drycell Battery	12 million pcs	Large	1	18.45	13.50	36	18.45	13.50	51	120	22.4	8.48	38	
8.	ACSR	756 Km	Small	3	2.41	1.25	22	7.33	3.75	30	450	18.42	7.22	39	
				12				30.49	20.78	218	720	48.66	18.54	38	

ATTACHMENT 4

Birgunj Sugar Factory Ltd.

The Birgunj Sugar Factory Ltd. (BSF) is the largest of the three major sugar mills in Nepal. It was built in 1964 with Russian Aid and is owned and fully operated by HMG.

Some ten years ago consideration was given to building a distillery which would convert their molasses into alcohol for domestic consumption. Market studies by BSF and ISC showed this to be feasible.

The distillery is now under construction.

The Divisional Chief in charge of the project was asked to what extent Nepalese project engineering resources were used and how, in future industry projects, these could be increased. His comments follow.

The Board of Directors at BSF believe in utilising Nepalese resources to the maximum although past, and present, experience has shown this to be not fully satisfactory.

For example when replacement cane hauling trailers were required a quotation was requested from a large local engineering firm. They refused to quote as they were not confident of being able to design. They were offered the existing trailer as a prototype and eventually agreed to supply. Delivery for 85 trailers took 2 1/2 years and was more than double the cost of the Russian quote. Similarly routine maintenance parts are regularly offered for local manufacture but delivery cannot be assured so the parts are either made by BSF or purchased out of the country.

For the distillery it was recognised that BSF had no technical knowledge so international tenders were called. Many international companies requested tender documents but few responded and eventually an Indian consulting engineer and equipment supplier was selected.

The architecture was done by BSF staff including the drafting. A local private firm build the buildings - power house, distillery, control building, administration building and these are excellent.

The boiler presented a special problem as the decision was to use three possible fuels - bagasse, wood and coal, rather than fuel oil. Again an Indian firm was the only one prepared to tender.

The storage tanks, both molasses and alcohol, were offered to large a Kathmandu engineering firm as was the necessary steel plate rolling equipment. They refused to quote so it was given to an Indian firm.

The electrical work was given to a large Kathmandu firm although a similar quotation was received from the General Electric Company, India, who would then have been responsible for the electrical equipment as well as the wiring.

This Nepalese firm has to date, January 1981, not arrived on the site but is requesting payment in advance which is refused by BSF.

In summary, BSF, an HMG own industry with financial and technical resources and the support needed to ensure reliable material supplies has shown itself to be more than willing to use and develop local firms. However the local firms, both government and private, have lacked the confidence to quote and, in the instances quoted, the ability to perform satisfactorily.

BSF would be pleased to have ISC engineers participate in their project to learn the "practical" rather than the present "theoretical" engineering work.

ATTACHMENT 5

Hetauda Textile Industry Ltd.

The Hetauda Textile Industry Ltd. (HTI) is an integrated cotton spinning, weaving, dyeing plant owned and operated by HMG. The factory was donated by Chinese Aid and build commissioned by Chinese experts in 1978. It operates on one shift, approximately 600 employees and is now totally operated and managed by Nepalese.

Operation is satisfactory with adequate cotton supplies and sales, against Indian imports, but there is some profit squeeze due to selling prices being fixed by the government. Maintenance is performed regularly by HTI workers and they are heading into their first major, 3 year, overhaul with confidence. Budgets are used with variances accepted due to raw material price fluctuations and monthly cost and management reporting also used by management. This cost and management reporting is still weak as there is a background of bookkeeping not control.

The Executive Chairman of HTI was asked whether HTI could assist in the project engineering of a second similar plant if this was build in Nepal; as is foreshadowed in the 6th five year plan. His answer was yes with the following comments.

A second plant should possibly be at Butwal in the Western District to serve the market there. It should probably be only a cotton spinning plant with weaving and finishing left to cottage industry. The overall employment would thus be higher with less major capital investment.

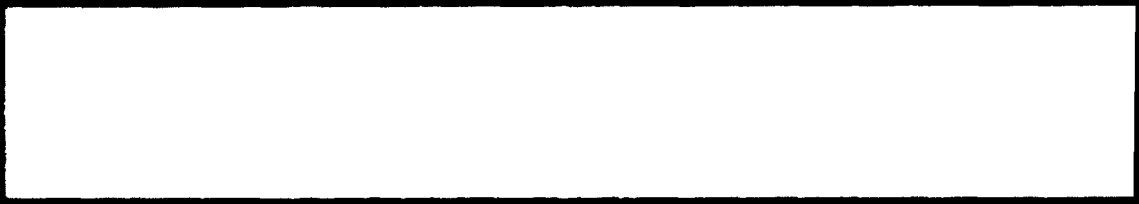
Such a plant could, with foreign equipment, be build and commissioned by Nepal. The present HTI type of equipment is suitable - not fully automated.

HTI could not assist in the civil and building works but this could be done by private Nepalese engineers and firms. The layout would be as recommended by the foreign equipment suppliers.

HTI could provide experts for the electrical work.

HTI could provide skilled workers for installation, commissioning, and operation and supervisor training.

In summary, future textile plants could be project engineered from Nepalese resources.



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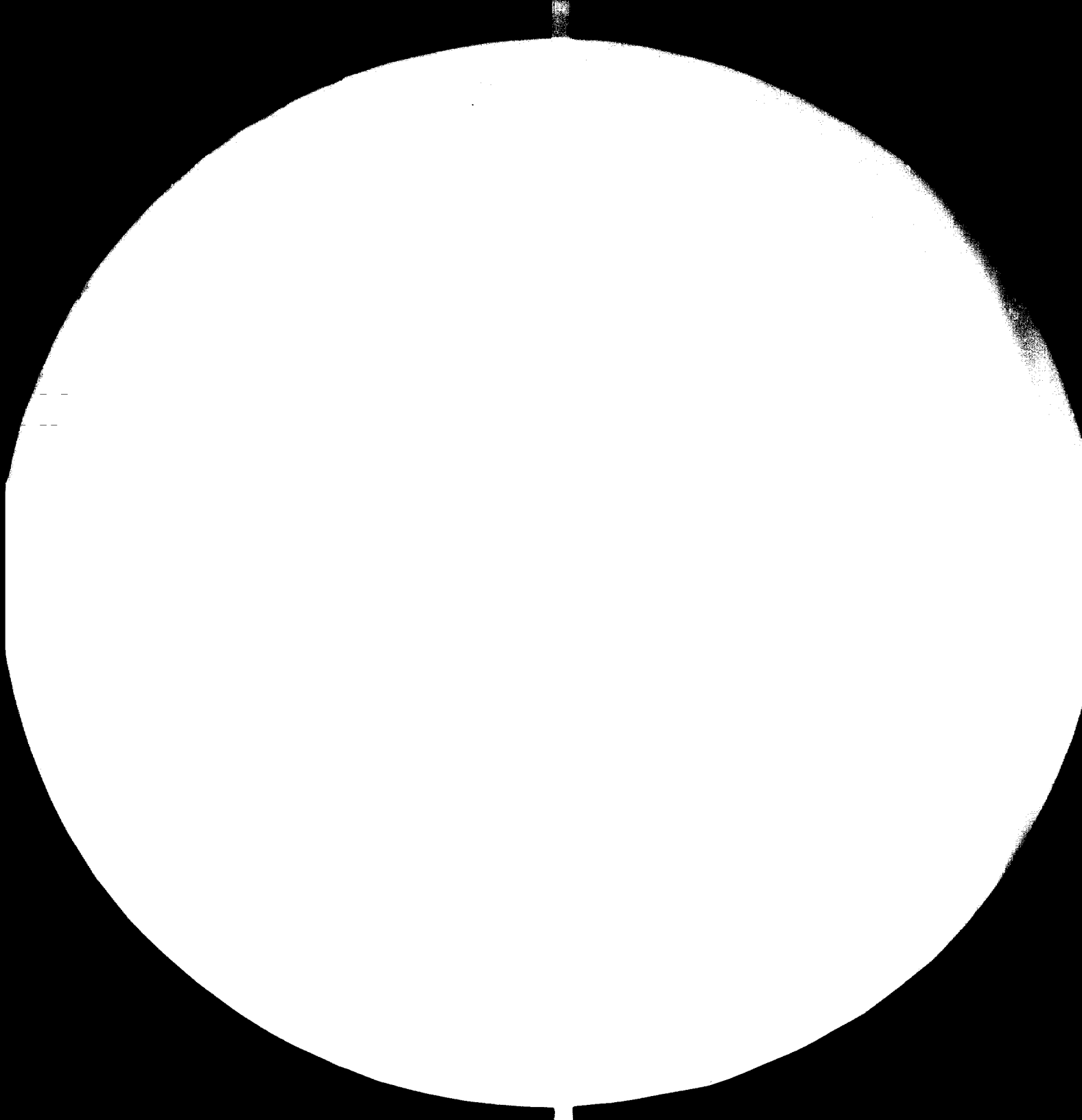

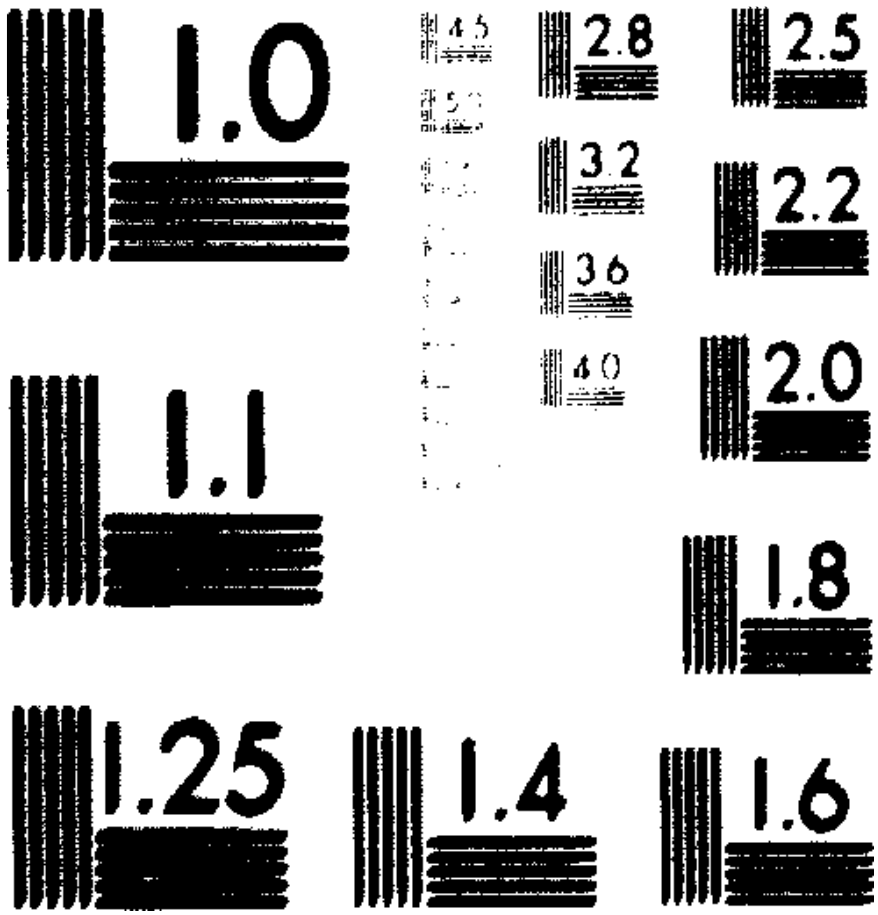

ATTACHMENT 6

Private Consultancy Firms

1. Architect Engineer & Constructs (EAC), 7/9 Battisputali
2. Nepal Engineers, Hadigaun Kathmandu
3. Nepal Engineering Enterprises, 20/187 Naxal
4. Architects & Engineers Services, Lagankhel Lalitpur
5. Nepal Consult, 23/1 Khichapokhari
6. Team Consultants, P.B. 271 Tripureshor
7. Designing & Consulting Engineers, 4/11 Lazimpat
8. Pali Architect & Engineers, 5/9 Tebahal
9. Inter Consult Associate, Kesharmahal
10. K.L. Kayastha & Associates, Chauni Kathmandu
11. Vyas Jain & Associates, 6/2 Battisputali
12. Modern Technical Consultants, Naradevi
13. Universal Consult, Mirahom Khichapokhari
14. Alpha Engineering, Dillibazar
15. Techno Consultant, 3/58 Siphal
16. Engineering Architectural & Araniko Organisation 17/21 Lazimpat
17. Engineering Service, Ramshah path
18. Structural Consulting Engineers, Yatkha Kathmandu
19. Nepal Enterprises, Narayanghar Chitaun
20. Frontier Engineering Services, 21/541 Dillibazar
21. Electrical Engineering & Constructs, Jyathatol
22. Engineering Enterprises, 20/321 Nayabazar, Kathmandu
23. Engineering Services, Tilathi Saptari
24. Bhrikuti Consultant, Juddhasadak
25. Hills Consulting Engineers, Architects & Planners Saibu Bhaisepati

26. New Engineering Consultant, Tahachal

27. Narendra Consulting Architectural Planner P.B., 1141 Bareshwar

28. Lubmini Engineering Consultant, Bhairahawa

29. Engineering Consultant, 21/651 Baneshwar

30. Ipko Dhumghadi, Kathmandu

31. Project Engineers Consultants, Pakanajol

32. Water Resources Consult, Bagdarbar

33. Nepa Consult 16/177 Thamel

34. General Engineering Concern, Jhoche

35. Norek Consultants, Kaliksthan

36. Ram Engineering Consultants, Nepalgunj

37. Ghorkha Architects & Engineering Consultancy, 27/162 Ramshahpath

38. Meca Engineering Services, Bhimsensthan

39. Shrestha Engineering & Servicing Consultants, 6/420 Tebahal

40. Bishara Engineering Consultancy, Janakpur

41. Tek Associates, Canabahal

42. Sigma Engineers, Chauni Kathmandu

43. Unie Designers, Nepalgunj

44. Dwiyal Engineering Services, Naxal

45. Snowy Consultants, Bagbazar

46. Impec Consult, 16/57 Thamel

47. Mines & Minral Consultancy Services, Colmadi Bhaktapur

48. Shri Ramhari Kapur Eastern Engineering Company Padriya Mahottari

49. Bright Consultants, 16/19 Ramshahpath

50. D.M. Engineers & Builders, 13 Himalayan white Tahachal

51. Technical Cooperation, Lazimpat

52. Engineers Associates, Keltole Kathmandu

53. M.B. Raut & Associates, Tripureshor

54. Nes Architects & Civil Engineering Consultants, Khichapokharai

55. Grehound Electronics, Guchhatole

56. Consolidated Engineers, B. 34 Kopundol

57. Mr. & Mrs. K and Co, Tekmachali

58. Suresh Consulting Services, Chabahil

59. Allied Engineering Consultants, Baneshwor

60. Engineering Consultants, Thapathali

61. Engineering Concern, Bhaktapur

62. Consultants, 20/231 Ganeshwor

63. Sonwala Engineers, Bhotebahal

64. Nepal Engineering Construction services, Bhaktapur

65. Environmental Engineers, Tripureshowor

66. Karma Engineering Consultants, Bagmati

67. Civil Engineering & Consultants, Lalitpur

68. Shrestha Consultants, Lalitpur

69. Sefo Consultancy, Bhaktapur

70. Kyal Consultancy, Bhaktapur

71. Katar Engineering Construction, Bhotahiti

72. Nepalese Architects & Engineering, Hiti

73. Industar Consultants, Kaski

74. M.K. Consulting Engineers, Pakanazol

75. Jemini Consulting Services, Kalimati

76. Graphic Map Concerns, Asan

77. Continental Consultants, Naxal

78. Designers Associates, Saptari

79. A.T.C. Amatya Techno Consults, Lalitpur

80. Consultancy Services, Asan

81. Knosis Engineering Consultancy, Biratnagar

82. Man Consulting Engineer Form, Bagbazar

83. Babhe Consultancy, Kopundol

84. Modern Architects & Engineering Consultancy, Kirtipur

85. Unitech Consultancy Services, Lalitpur

86. Amshubarma Consultants, Baneshwor

87. Jiyo Consultants, Dillibazar

88. Trishul Engineering Consultancy, Mangal bazar

89. Techn & Civil Engineering, Battisputali

90. G.S. Engineer & Consultant, Janakpur

91. Umistar Engineering, Jhoche

92. Rabindra Engineers & Designers, Palpa

93. Hydro Engineering Services, Naxal

94. Malla Research Consulting Services, Kamalpokhari

95. The Globe Consultant, Kalimati

96. Mahakali Engineering Consultancy, Mahendra Nagar

97. Himal Engineers Associates, Pulchowk

98. Amar Consultant, Baneshwor

99. Multi Disciplinary Consultants, Kopundol

100. M.P. Dawai & Associates, Lagankhel

101. National Environmental & Engineer Consultants Tangal

102. Himalayan Technical Consultants, Naxal

103. Agro Consultants, Kilagal

104. Nepal Industrial Services Centre, Kathmandu

105. S.K. Bhattarai & Associates, Pakanajole

106. M.K. Shrestha & Associates, Kamaldhi

107. Soil Test & Civil Designers, Maharajgunj

108. Shrestha Consultancy Services, Pakanajole

109. International Services Bureas, Dhokatole

110. The Peace Consulting Engineers, Dharan

111. Suraj Engineering & Construction Consultants

112. Acharya Surveying & Engineering Consultants, Baglung

113. Bhankar Tech. Ramshahpath

114. Shrestha Engineering Consultancy Services, Lalitpur

115. Wagle Associates, Handigaun

116. Range, Dillibazar

117. Chember of Industries

118. Mohan K. Pandey, Bhimsensthan

119. Sumwar Engineering Consultancy Services, Thamel

120. Industrial Development Services, Tahachal

121. Arun Colabrated Services, Tahachal

122. J.K. Engineering Consultancy, 8/517 watu

123. Gandaki Technical Services Bagar, Pokhara

124. Lumba Consultancy, Patan

125. E.E.C. Consultancy, Phasikeb

126. Institute for Development Studies, Dillibazar

127. Aasa Engineering Consultants, 16/131 Ghalayacha Patan

128. Development Research Centre, Baluwatar

129. Nepal Project Research Centre, Thapathali

130. Prina Engineering & Hydrology Consultants, Handigaun

131. Bicas Consulting Engineers, 2/7 Tripureshwor

132. D.L. Consulting Engineer, 9/950 Kilagal

133. Srizana Consultant, Tyodtole

134. Building Design Associates, Lal Durbar

ATTACHMENT 7

Nepal Consultants Association

There are 40 member firms of the Association, of these the majority are government employees who form a firm for a project and then return to their regular employ.

Possibly three full time firms are in existence. Typical is Everest Group (P) Ltd. with three full time professionals and a staff listing of 200 part time specialists. Their major activity is feasibility studies and they specialise in industrial projects (supplied by NIDC) and micro hydroelectric feasibility studies (in conjunction with foreign consultants).

The Association is concerned with:

1. HMG Department competition from individuals within the Departments.

2. Price cutting competition which is sought by clients without regard to quality or professionalism.

3. Local agents appointed by foreign consultant firms who treat the profession as a trading venture with a commission as the measure of success.

4. Lack of opportunity to participate in a meaningful fashion with foreign consultant firms working in Nepal. Particularly due to the wide gap in fee rates between foreign and local firms which is comparably reflected in the necessary man-month allocation. Then the high local man-months cause concern with the Aid Agencies.

5. The overall lack of a professional ethics code.

These issues are being raised with the Minister of Industry and with the Aid Agencies to seek a solution.

ATTACHMENT 8

Job Prospect File

Job Prospect

Company:

Project:

Executives:

ISC Contact by	Date	Comments & Action	Follow Up Date

File by follow-up date.

ATTACHMENT 9

Criteria for Marking

A.	Comments on the Scope of Services:			10
	a) Total service as per the instruction in ISC information sheet.		5	
	(i)	Assessment of quantum of work in various construction activities.	1	
	(ii)	Reasonable forecasting of work in construction for the future.	1	
	(iii)	Requirement of construction materials, use and availability of equipments and utilisation of pre-fab products.	1	
	(iv)	Drawing up of specific project proposals.	1	
	(v)	Extra work mentioned in the proposal which would be a welcome addition, and which has not been mentioned.	1	
	b) Discussions on the Scope of Services:		2	
	(i)	Good comments.	2	
	(ii)	Relevant comments.	1	
	(iii)	No comments.	0	
	c) Deficiency in Scope of Services:		3	
	(i)	No deficiency.	3	
	(ii)	Deficiency of any of the four points covered in a (i) to (iv) will penalised through a deduction of one point each for each omission.		
B.	Methodology:			30
	a) Steps to be taken for the study:		15	
	(i)	Preliminary desk work and data collection methodology.	2	
	(ii)	Field trips to various areas.	3	
	(iii)	Method of analysis of raw data.	5	
	(iv)	Approach, towards drawing specific proposals.	7	
	b) Area of field trips:		5	
	(i)	Major urban areas of the four.	2 1/2	
	(ii)	Other areas of construction other than the urban areas.	2 1/2	

C. Experience of the Firm: 30

a) Involvement in type of work to be performed: 10

(i) Involvement in survey work of the type required in the study. 2
- a. Extensive involvement 2
- b. Moderate involvement 1
- c. No involvement 0

(ii) Involvement in feasibility. 2
- a. Extensive involvement 2
- b. Moderate involvement 1
- c. No involvement 0

(iii) Knowledge of construction activities. 2
- a. Extensive knowledge on the basis of experience 2
- b. Moderate knowledge on the basis of experience 1
- c. No knowledge on the basis of experience 0

(iv) Involvement in preparation of reports of the type comtemplated. 2
- a. Extensive involvement 2
- b. Moderate involvement 1
- c. No involvement 0

(v) Knowledge of construction activities. 2
- a. Extensive knowledge on the basis of experience 2
- b. Moderate knowledge on the basis of experience 1
- c. No knowledge on the basis of past experience 0

b) Analogous projects undertaken: 5

(i) Variety of studies undertaken where survey is a very important part of the study. 2 1/2

(ii) Other related studies 2 1/2

c) Bio data of staff: 15

(i) Experience of staff in the fields of study. 7 1/2
- a. Experience of three senior engineers 2 1/2
- b. Experience of three senior economists 2 1/2
- c. Experience of consultants or manpower capable of functioning as consultants 2 1/2

(ii) Qualifications of staff to be involved in the study. 7 1/2
- a. Qualifications of the engineers 2 1/2
- b. Qualifications of the economists 2 1/2
- c. Qualifications of the consultants or manpower capable of performing the role of consultants 2 1/2

D. Time Period: 10

With the inclusion of one more region for studies, the probable time requirement for conducting the total study would be approximately six months.

(i)	Six months	10
(ii)	Two months	2
(iii)	Twelve months	4
(iv)	Between two to six months proportionate increment in marks	
(v)	Between six and twelve months proportionate decrement in marks.	

E. Cost of Study: 30

Although proposal of ISC sent to NIDC mentions a cost of Rs. 70,100, a realistic cost worked out for the four development regions is Rs. 62,000. Now through optimum sharing of overheads, and increased efficiency may be possible to bring the costs down by a further 10%. The minimum anticipated cost is Rs. 56,000.

(i)	Rs. 56,000 in cost	30
(ii)	Rs. 116,000 in cost	0
(iii)	Rs. 26,000 in cost	0
(iv)	Between 26,000 and 56,000 a decrement of 1 mark for every Rs. 1,000 decrease in cost from Rs. 56,000	
(v)	Between 56,000 and 116,000 a decrement of 1 mark for every Rs. 2,000 increase in cost from Rs. 56,000.	

ATTACHMENT 10

Reference Material

The ISC Documentation and Publication Branch contains a library with reference materials including technical reference handbooks. These nandbooks form part of the background knowledge which is available to the Project Engineering Branch and the Nepalese engineering ommunity.

A review of the handbooks showed that the following were in stock:

Civil Engineering

Standard Handbook of Civil Engineering by Gurcharam Singh
Indian Practical Civil Engineering Handbook by P.N. Khanna
Standard Handbook for Civil Engineers by Merritt*
Estimating and Costing in Civil Engineering by B.M. Ditta 1978

Mechanical Engineering

Machinerys Handbook 1971
Kents Mechanical Engineers Handbook
Plant Engineers Handbook by Staniar*

Electrical Engineering

Guidebook of Electrical Circuits by Markus*

Chemical Engineering

Chemical Engineers Handbook by John H. Perry

Airconditioning Engineering

Handbook of Airconditioning System Design by Carrier*

Process Engineering

Handbook of Electroplating, Anodizing and Metal Treatment
Chemical and Process Technology Encycloplating by Douglas M. Considine
Standard Handbook of Textiles by Hall
Handbook of Pulp and Paper Technology by Paritt
Handbook of Small Scale Plastic Industries by R.K. Gufti

Industrial Management

Purchasing Handbook by A. Giam
Production and Inventory Control Handbook by Greame
Handbook of Modern Marketing by Buell
Handbook of Industrial Engineering and Management by Ireson & Grant
Quality Control Handbook by Juran
Industrial Location by David M. Smith
The Entrepeneurs Handbook by Mancuso
Handbook of Modern Office Management and Administration Services by Heyal*

* published by McGraw Hill

Other reference books may be on loan or available from other Nepalese Libraries or individual professionals. However it is not the intent to follow through to such detail but to suggest that there are some gaps which could be filled by the Documentation Branch.

Noticeable needs from the present range are:

Electrical Engineering

A recognised, authoritative Handbook
Industrial electronics reference book

Industrial Management

Cost and management accounting reference books
Maintenance Management Handbook
Safety reference books

Beyond the present range there is a need for handbooks and reference books on:

Draughting standings
Hydraulics and plumbing
Hydro-engineering, sewerage and waste disposal
Surveying
Soil Technology

Also there is a need for professional and commercial journals such as by foreign institutes, colleges, chambers, associations etc.