Chapter 1: Background Perspective

1.1. Impacts and Consequences of Technology on Society

1.2. Effects of Major Technological Developments such as Printing, Gunpowder, Mechanization, Computer, Organic Chemistry, Communication Satellites,

1.3. Cultural Motivations and Limitations,

1.4. Eastern vs. Western Philosophy of Change and Development,

1.5. Political and Limitations, Individual Freedoms versus Social Goals,

1.6. Exponential Growth. Alternative use of Scarce Resources,

1.7. Cause of International Tensions,

1.8. Risk and Overall Cost/Benefit,

1.9. Rational Analysis in Engineering Decision Making,

1.10. Education and Training of Technologists, Scientists and Engineers.

1.0 Society and its Elements

Definition of Society:

Many definitions of society; the definitions keeps changing, since society is dynamic.

- Schaefer and Lamm: the largest form of human group, which consists of people who share common heritage and culture. (Richard T. Schaefer and Robert P. Lamm)
- Ian Robertson: society gives content, direction and meaning to our lives, and we, in turn, in countless ways, reshape the society that we leave to the next generation. Society is a population that occupies the same territory, is subject to the same political authority and participates in a common culture.
- P. Gisbert: a complicated network of social relationships by which every human being is interconnected with his fellowmen.
- MacIver and Page: a system of usages and procedures, authority and mutual aid, of many groupings and divisions, of controls of human behavior and of liberties.
- Ginsberg: a collection of individuals unified by certain relation or modes of behavior, which mark them off from others who do not enter into these relations or who differ from them in behavior
- A.W. Green: the largets group to which any individual belongs
- John F. Cuber: a group of people who have lived long enough to become organized and to consider themselves and considered as a unit more or less distinct from other human units.

1.0.1 A settlement with the following criteria is called a society

- Population: A society has population. It can be small or big.
- Common territory: The people of a society occupy a common territory.

- Government or political authority: The people of a society have a common government and political authority.
- Common culture and a sense of relationship/membership and committed to group.

1.0.2 Essential elements of a society

- People and plurality: society consists of people, of both sexes, of different physical features (age, skin color, eye color, hair color, height, weight, face type)
- Likeness and differences: Members of a society are alike in many aspects. This "alikeness" bonds them, and they seek understanding and cooperation from each other. The members of a society are different in many ways too, like culture (language, religion, art, music, dance, food, dress, values, belief system), profession, interest, opinion, views etc.
- Cooperation and interdependence: Members of a society cooperate with each other, and they depend on each other. When the level of mutual cooperation reduces, society tends to disintegrate.
- Stable and dynamic: Society is relatively stable; the norms, values, and culture are normally stable/. Yet, society is dynamic. Some elements of a society change slowly, and some change rapidly, depending on external and internal factors.

1.0.3 Types/Evolution of Society

- Tribal: hunting and gathering society
- Pastoral: domesticate animals
- Horticultural: domesticate plants
- Agricultural/feudal: cultivation of crops, animal energy, irrigation, saving of seed
- Industrial: mechanized production, mass production
- Post-industrial: information and service, generation of knowledge

1.0.4 Factors/Drivers/Causes of social change

- Physical environment/Contact with other societies: Physically easily accessible society changes rapidly than those located in remote (difficult to access) areas due to frequent contacts with members of different societies.
- Natural causes: Earthquake, landslide, flood, desertification, and tsunami disintegrate social fabric and changes society.
- Technological: Information, knowledge and skills: Rate of social change depends on access to information, ability to put together the information into knowledge, ability to convert the knowledge into skills
- Anthropogenic (Human) activities: International War, Civil War, displacement for "developmental" activities, industrial accidents, mass migration, education, economic opportunity

1.0.5 Classical Theories of social change:

I. **Cyclical:** ups and downs, birth and death, Oswald Spengler: approximate 1000 year cycle. Critics of this theory cite examples that do not follow the 1000 year cycle.

II. **Evolution:** changing with time, getting complex with time, society develops through time and change.

III. **Functionalist:** changes as required to keep the whole society functioning, when particular part of a society changes; based on the assumption that society is a stable, orderly system; August Comte (1798-1857), Herbert Spencer, Emile Durkheim, and Talcott Parsons propagate this theory. Society is composed of interrelated parts, each of which serves a function and contributes to the overall stability of the society. This theory emphasizes on changing role of different parts of a society to maintain stability of a society.

IV. **Conflict:** Karl Marx (19th century) social class conflict between haves and have-nots. Expanded version of conflict theory finds social conflict between any groups in which the potential for inequity exists: racial, gender, religions, political, economic, and so on. Unequal groups usually have conflicting values and agendas, causing them to compete against one another. This constant competition between groups forms the basis for the ever-changing nature of society.

The triad is usually described in the following way:

- The thesis is an intellectual proposition.
- The antithesis is simply the negation of the thesis, a reaction to the proposition.
- The synthesis solves the conflict between the thesis and antithesis by reconciling their common truths and forming a new thesis, starting the process over.

Cyclical: The Greeks were the first to utilize this model. Plato spoke of eras of time when, initially, hope blossoms only to deteriorate as that era disintegrates. Spengler's view of change was very similar to that of the Greeks, but his model was dressed in a biological rather than uuologica1 garb. Culture, according to him, is the living entity of people, and culture is housed in the civilization of that it arises, develops, ripens, decays and falls never to return. An element of hope, however, was predicted in a similar model by Toynbee, who believed the cyclical change could be interrupted by the creative minority. More recently Sorokin considered that social changes follow a trendless cyclic pattern, i.e., like a swinging pendulum, culture moves in one direction and then back in another. The functionalist perspective, also called functionalism, is one of the major theoretical perspectives in sociology. It has its origins in the works of Emile Durkheim, who was especially interested in how social order is possible or how society remains relatively stable.

Functionalism interprets each part of society in terms of how it contributes to the stability of the whole society. Society is more than the sum of its parts; rather, each part of society is functional for the stability of the whole society. The different parts are primarily the institutions of society, each of which is organized to fill different

needs and each of which has particular consequences for the form and shape of society. The parts all depend on each other.

For example, the government, or state, provides education for the children of the family, which in turn pays taxes on which the state depends to keep itself running. The family is dependent upon the school to help children grow up to have good jobs so that they can raise and support their own families. In the process, the children become law-abiding, taxpaying citizens, who in turn support the state. If all goes well, the parts of society produce order, stability, and productivity. If all does not go well, the parts of society then must adapt to recapture a new order, stability, and productivity.

Functionalism emphasizes the consensus and order that exist in society, focusing on social stability and shared public values. From this perspective, disorganization in the system, such as deviant behavior, leads to change because societal components must adjust to achieve stability. When one part of the system is not working or is dysfunctional, it affects all other parts and creates social problems, which leads to social change.

The functionalist perspective achieved its greatest popularity among American sociologists in the 1940s and 1950s. While European functionalists originally focused on explaining the inner workings of social order, American functionalists focused on discovering the functions of human behavior. Among these American functionalist sociologists is Robert K. Merton, who divided human functions into two types: manifest functions, which are intentional and obvious, and latent functions, which are unintentional and not obvious. The manifest function of attending a church or synagogue, for instance, is to worship as part of a religious community, but its latent function may be to help members learn to discern personal from institutional values. With common sense, manifest functions become easily apparent. Yet this is not necessarily the case for latent functions, which often demand a sociological approach to be revealed.

Functionalism has received criticism for neglecting the negative functions of an event such as divorce. Critics also claim that the perspective justifies the status quo and complacency on the part of society's members. Functionalism does not encourage people to take an active role in changing their social environment, even when such change may benefit them. Instead, functionalism sees active social change as undesirable because the various parts of society will compensate naturally for any problems that may arise.

Conflict theory emphasizes the role of coercion and power in producing social order. This perspective is derived from the works of Karl Marx, who saw society as fragmented into groups that compete for social and economic resources. Social order is maintained by domination, with power in the hands of those with the greatest political, economic, and social resources. When consensus exists, it is attributable to people being united around common interests, often in opposition to other groups.

According to conflict theory, inequality exists because those in control of a disproportionate share of society’s resources actively defend their advantages. The masses are not bound to society by their shared values, but by

coercion at the hands of those in power. This perspective emphasizes social control, not consensus and conformity. Groups and individuals advance their own interests, struggling over control of societal resources. Those with the most resources exercise power over others with inequality and power struggles resulting. There is great attention paid to class, race, and gender in this perspective because they are seen as the grounds of the most pertinent and enduring struggles in society.

Whereas most other sociological theories focus on the positive aspects of society, conflict perspective focuses on the negative, conflicted, and ever-changing nature of society. Unlike functionalists who defend the status quo, avoid social change, and believe people cooperate to effect social order, conflict theorists challenge the status quo, encourage social change (even when this means social revolution), and believe rich and powerful people force social order on the poor and the weak. Conflict theorists, for example, may interpret an "elite" board of regents raising tuition to pay for esoteric new programs that raise the prestige of a local college as self-serving rather than as beneficial for students.

Whereas American sociologists in the 1940s and 1950s generally ignored the conflict perspective in favor of the functionalist, the tumultuous 1960s saw American sociologists gain considerable interest in conflict theory. They also expanded Marx's idea that the key conflict in society was strictly economic. Today, conflict theorists find social conflict between any groups in which the potential for inequality exists: racial, gender, religious, political, economic, and so on. Conflict theorists note that unequal groups usually have conflicting values and agendas, causing them to compete against one another. This constant competition between groups forms the basis for the ever-changing nature of society. Critics of the conflict perspective point to its overly negative view of society. The theory ultimately attributes humanitarian efforts, altruism, democracy, civil rights, and other positive aspects of society to capitalistic designs to control the masses, not to inherent interests in preserving society and social order.

There are many theories of social change. Generally, a theory of change should include elements such as structural aspects of change (like population shifts), Processes and mechanisms of social change, and directions of change.

- Hegelian: The classic Hegelian dialectic model of change is based on the interaction of opposing forces. Starting from a point of momentary stasis, Thesis countered by Antithesis first yields conflict, then it subsequently results in a new Synthesis.
- Marxist: Marxism presents a dialectical and materialist concept of history; Humankind's history is a fundamental struggle between social classes.
- Kuhnian: The philosopher of science, Thomas Kuhn argues in The Structure of Scientific Revolutions with respect to the Copernican Revolution that people are unlikely to jettison an unworkable paradigm,

despite many indications that the paradigm is not functioning properly, until a better paradigm can be presented.

- Heraclitan: The Greek philosopher Heraclitus used the metaphor of a river to speak of change thus, "On those stepping into rivers staying the same other and other waters flow" (DK22B12). What Heraclitus seems to be suggesting here, later interpretations notwithstanding, is that, in order for the river to remain the river, change must constantly be taking place. Thus one may think of the Heraclitan model as parallel to that of a living organism, which, in order to remain alive, must constantly be changing. A contemporary application of this approach is shown in the social change theory SEED-SCALE which builds off of the Complexity Theory subfield of Emergence.
- Daoist: The Chinese philosophical work Dao De Jing, I.8 and II.78 uses the metaphor of water as the ideal agent of change. Water, although soft and yielding, will eventually wear away stone. Change in this model is to be natural, harmonious and steady, albeit imperceptible.
- Resource-based economy: Jacque Fresco's concept of a resource-based economy that replaces the need for the current monetary economy, which is "scarcity-oriented" or "scarcity-based". Fresco argues that the world is rich in natural resources and energy and that — with modern technology and judicious efficiency — the needs of the global population can be met with abundance, while at the same time removing the current limitations of what is deemed possible due to notions of economic viability. Fresco's work in The Venus Project deals with physical reality and natural law rather than economic abstractions. The Venus Project's website says this: "The Venus Project is neither Utopian nor Orwellian, nor does it reflect the dreams of impractical idealists. Instead, it presents attainable goals requiring only the intelligent application of what we already know."[

1.0.6 Eastern and Western values of society

Eastern Values

Panchasheel:

1. Mutual respect for each other's territorial integrity and sovereignty,
2. Mutual non-aggression,
3. Mutual non-interference in each other's internal affairs,
4. Equality and mutual benefit, and
5. Peaceful co-existence

i. Social Harmony

ii. Sacrifice for the welfare of group

iii. Modesty and frugality

iv. Truth and Integrity

v. Respect to elder, teacher, guest and ancestor

vi. Maintaining culture and tradition

vii. Helping the people in need (Paropakar)

viii. Purity in thought and acts

ix. Ritual as important as devotion or work

Western/American Values (Robin Williams, 1970)

i. Achievement and success

ii. Activity and work

iii. Moral orientation

iv. Humanitarianism

v. Efficiency and practicality

vi. Progress

vii. Material comfort

viii. Equality

ix. Freedom

x. External conformity

xi. Science and rationality

xii. Nationalism-patriotism

xiii. Democracy

xiv. Individual personality

xv. Group-superiority themes

1.0.7 Brief History of engineering practice in eastern and western societies

1.1 Impacts and Consequences of Technology on Society

1.1.1 Socio-cultural Impact

Impact on	Impact
Livelihood	Livelihood is diversifying, many types of livelihood options available
Specialization of Profession	Specialization in profession is increasing.
Health	Access to health services is increasing, specific medicines are available, diagnosis process improving, genetic engineering is curing previously incurable diseases, assistance to specific needs of disabled persons getting

	better through technically designed equipment, welfare of aged citizens getting better
Education	Access to education services getting better, distance learning is improving access to education and latest information, e-book, e-library, standardization of educational quality through use of ICT technology, on line evaluation, on line test possible,
Family	Family relation getting complex due to in-vitro fertilization, test-tube baby, cloning, Family size reducing due to easier access to contraception, micro-family getting possible, life span increasing, several generation in family, change in status of female and disabled
Living Standard	Living standard increasing, HDI increasing, poverty decreasing, employment opportunity increasing, price of goods decreasing
Language	Use of international language increasing, language use getting standardized through mass media, brail script helping blind, sign language use increasing for deaf
Social Norms and Values	Social norms and values increasingly being challenged and altered or replaced, social class disintegrating, new economic class emerging
Family tradition, culture, heritage	Family traditions increasingly being challenged and altered or replaced, heritage preservation getting better
Urbanization	Urbanization increasing, concentration of resources and resource users
Commercialized Recreation	Traditional dances, music, drama and games giving ways to movies, video games, theme parks, pay per view programs

Chapter 2

Profession and Ethics
(Part II)

A Profession

Engineering Science + Engineering Design +
Professionalism and Engineering Ethics
=
The Profession of Engineering!

Characteristics of a Profession

1. Systematic knowledge and skill based on scientific theory
2. Professional association
3. Sense of community
4. Authenticity of knowledge and Skill(License)
5. Extensive Period of education
6. Institutional training/Long training period
7. Code of professional conduct or code of ethics

Characteristics of a Profession

8. Public service and interest
9. It is public property and matter of public evaluation
10. Exclusion, monopoly and recognition
11. High status and reward
12. Legitimacy
13. Mobility, etc

Professional Association

A group of people in a learned occupation who are entrusted with maintaining control or of the legitimate practice of the occupation.

Principal Objectives:

- *Center of Learning*
- *Provider of Professional Status with responsibility*
- *Voice of Profession*
- *Facilitator of Best Practice*

Nepal Engineering Association(NEA)

NEA is the apex non profit national body of Nepalese Engineers established in 2024 BS.

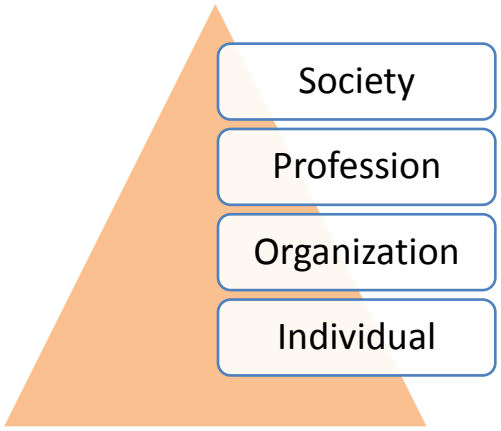
Objectives:

- *Promote and development of Engineering Science and Technology*
- *Promote fellowship goodwill and cooperation among the engineers and safeguard their right and interests.*
- *Participation on National Development activities*
- *Enhance the professional ideals and widen it*
- *Develop relation, fellowship and goodwill with international association and institutions*

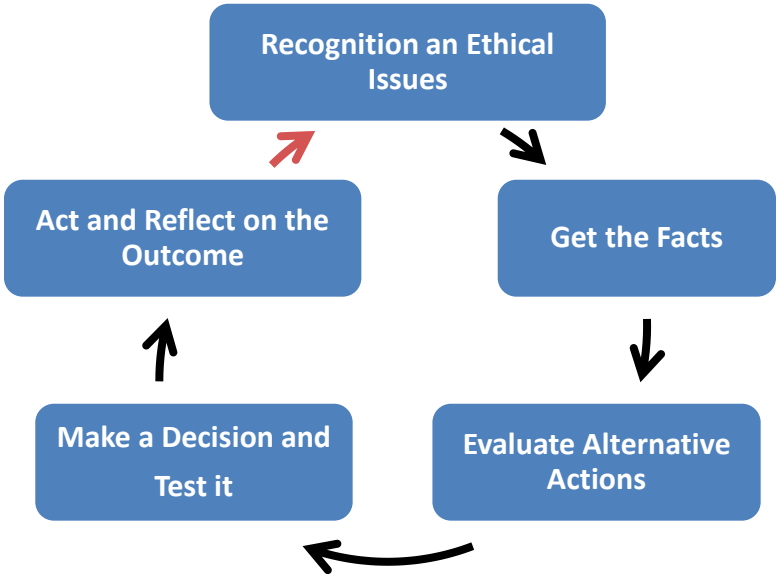
Professional Code of Conduct by NEC

1. *Discipline and Honesty-* अनुशासन तथा इमान्दारिता
2. *Politeness and Confidentiality-* शिष्टता तथा गोपनीयता
3. *Non Discrimination-* भेदभाव गर्न नहुने
4. *Professional Work-* सम्वन्धित व्यवसायिक काम मात्र गर्नु पर्ने
5. *Deeds which may cause harm to the engineering profession-* इन्जिनियरिङ्ग व्यवसायमा आँच आउने काम गर्न नहुने
6. *Personal Responsibility-* व्यक्तिगन उत्तरदायित्व
7. *State name, designation and registration no -* नाम, पद र दर्ता नं. खुलाउनु पर्ने
8. *No publicity or advertisement must be made which may cause unnecessary effect-* अनावश्यक प्रभाव पार्ने किसिमबाट प्रचार प्रसार तथा विज्ञापन गर्न नहुने

Priority in making ethical decision



Framework for Ethical Decision Making



Ethical System on Decision Making

Utilitarianism	• Decision is right or good only if it generate largest benefit with low cost and harm
Universalism / Consistency	• Same decision with present circumstances
Distributive Justice	• Focus on least disadvantage member
Personal Liberty	• Freedom to develop their own after it

Ethical Standards

Utilitarian Approach	• Most Good and least Harm
Rights Approach	• Respect other Rights
Fairness or Justice Approach	• Treat equally within rules
Common Good Approach	• Welfare of everyone
Virtue Approach	• Value deals with courage, love , tolerance, Honesty, etc.

Putting Approaches Together

Particular circumstances and similar output

Negligence, Tort and Liability

Negligence: Lack of proper Care and Attention or Failure to exercise that a carefulness prudent person would exercise

Duty of Care – Gap of Expectation – Cause of Loss

Tort: Damage, injury or wrongful act doing willfully or negligently

Wrongful act – Compensation to victims- Prevention

Liability: Being bound to pay damage for not fulfilling the duties

Consequence of Negligence and Tort – Obligation of Penalty

Liability under

1. CONTRACT

2. TORT

3. STATUS

Chapter 3

Profession Practice in Nepal

Public Sector Practice

Government organizations like Ministries, Departments, Regional and District offices,
Corporations (Nepal Telecom, NEA, Nepal Airlines, etc)
Universities (institute of engineering, KU, PU, etc.

Job Description:

For Engineers

1. To perform preliminary and detail survey, design and estimate
2. To execute and assign for execution of project works
3. To conduct various programs for increasing people's capacity.
4. To report writing of
    a. Progress report
    b. Feasibility report
    c. Final report
    d. Monitoring and evaluation report etc.

Public Sector Practice

5. To monitor and evaluate ongoing projects
6. To facilitate donor agencies if involved
7. To execute and perform works and jobs assigned by superiors, and
8. To execute other jobs planned specifically for engineers as the nature and case be.

For gazette second class engineers

1. Planning programming and execution of works.
2. Research on technology, cases , various skills for upgrading,
3. Monitoring, and evaluation and supervision of projects,
4. Administrative activities,
5. Financial administrative activities.

Private Sector Practice

Private sectors: Construction companies, consulting companies, private engineering colleges etc.

Job Description:

1. To coordinate works between stakeholders- clients, consulting and contractors
2. To layout works, to survey and to estimate,
3. To supervise, monitor, and control works,
4. To control quality, to assess and report to concerning authorities,
5. To prepare bills as a quality surveyor,
6. To plan project and report progress,
7. To prepare technical report and prepare claims if any,
8. To conduct necessary training regarding site work and office organizations system to new staffs,
9. To overall manage of construction project etc.

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Fresh Engineer

Job Description (Fresh Computer Engineer)

1. Understanding Computer hardware and architecture
2. Experiencing designing, coding and testing software
3. Familiarity with software test procedure or scripts
4. Experience building own PC System
5. Understanding different operating system and devices drivers
6. Understanding networking and security
7. Interlinking organization and engineering profession

Community Participation in Development Activities

To take part in Community Development

1. Sharing project cost
2. Increasing project efficiency and effectiveness
3. Building beneficiary capacity
4. Increasing Empowerment

Importance of Community Participation

1. Brings positive changes
2. Common welfare with co-operation and learning
3. Problem sharing and solving
4. Resource identification and economic judgment
5. Breaking dependency and passivity

Chapter 4

Contract Management
(Part I)

"A pessimist sees the difficulty in every opportunity.

An optimist sees the opportunity in every difficulty"

Which do you choose to be?

Consumers

Providers

Commissioning

Supplier Relationship Management

Contract Management

Service Performance Management

Account Management

What is Contract Management

- The process of managing the relationship between two parties, a buyer and seller with the aim of attaining the procurement objectives.
- It involves managing of the cost details, process , quality and time lines from the beginning to the end of the contract delivery.

4

Aim of contract management

- To obtain the goods and services as agreed in the contract
- Achieve value for money
- Ensure that the buyer performs according to terms of the contract.
- Building a good working relationship between customer and provider.

5

What does contract Management Involves?

- Clarification of the roles and responsibilities of stakeholders
- Ensuring mutual understanding of the rights, obligation and responsibilities
- Addressing the risks that may arise
- Handling any appropriate changes where necessary (variations)
- Supervising or monitoring the contract against key performance indicators (e.g. procedures, cost control, quality and timeliness)
- Measuring and authorizing works
- Delivery inspection
- Paying according to agreed terms and avoiding overpayment.
- Compiling and disseminating of reports on performance

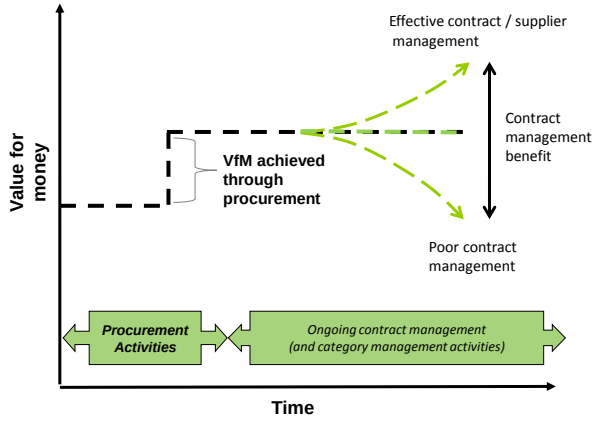
Why is contract management important?

Benefits of contract management:

The effective management of contracts with suppliers is maximising benefits from procurement:

- Obtaining value for money
- Managing risk
- Maximising end user outcomes

Role of contract management in retaining and improving value for money



FOCUS ON OUTCOMES AND NOT THE PROCESS

Quality Assurance of Contract Management

1. Improve capability

Develop and implement a contract management capability framework

- ☑ On-line procurement induction program to include contract management module
- ☑ Contract management training

2. Value / risk approach

Apply a value/risk matrix to define expectations for contract management and appropriate resource allocation to contracts

- ☑ Value/risk matrix
- ☑ Contract management plan and Contract management checklist templates

3. Contract extensions and renewals

Validate value for money before extending/renewing a contract, through assessment of contract risk, demand, supply market and supplier performance

- ☑ Checklist for contract extensions/renewals
- ☑ Fact Sheet
- ☑ Contract Review Report template

4. Contract management lifecycle system

Implement a contract management lifecycle system to enable spend analysis, monitoring of supplier performance, early triggers to prepare for contract expiry

Contract Management Framework

Background to its development and purpose:

- Consistency
- Ensure contractual obligations are met, risks are managed, value obtained
- Describes the three major phases of the contract management lifecycle and

key activities:

Phase 1 – Contract set up
Phase 2 – Contract management
Phase 3 – Contract close out

Supporting materials:

- Tools and templates, Fact sheets, Procurement guidance

Effective contract management begins with good planning

Contract management requires involvement during the Procurement process and not simply after the contract has been awarded.

Effective contract management starts at the sourcing process through to the relationship management of the supplier to ensure the optimum efficiency and increased service levels so as to avoid having to utilise contractual terms to achieve the performance expectations.

It's a process that requires teamwork and partnership skills through regular reviews and engagement.

Benefits of effective contract Management

- Improved quality of service ,works and goods delivered
- Improved customer focus.
- Timely delivery
- Achieving value for money
- Cost control and savings.
- Reduced crisis management
- Avoiding disputes
- Evaluation of the specifications against contract performance and identification of changes that would benefit future contracts

12

The contract management plan should define

- What reports are required
- What content should include in each report
- The format of presentation of the report
- Who is responsible for producing the report
- The frequency of reporting
- To whom the reports should be distributed

13

The right contract.

- The contract is the foundation for the relationship.
- It should be clear on:
  Identification and allocation of risk,
  specifications
  procedures for dispute resolution.
- Good corporate governance
- Effective monitoring
  The performance under the contract must be monitored to ensure that the customer continues to get value for money.

Relationship management.

Mutual trust and understanding, openness, and proper communications are as important to the fulfillment of the formal contract terms and conditions.

- People with the right skills
- Flexibility

14

Procurement Procedure in Nepal

- National Competitive Bidding (NCB)
- International Competitive Bidding (ICB)
- Sealed Quotation
- Direct Procurement
- Work through Users Committee
- Work done through Force Account

15

Contract is an agreement between two or more than two persons to do or not to do something. – Contract act 2056

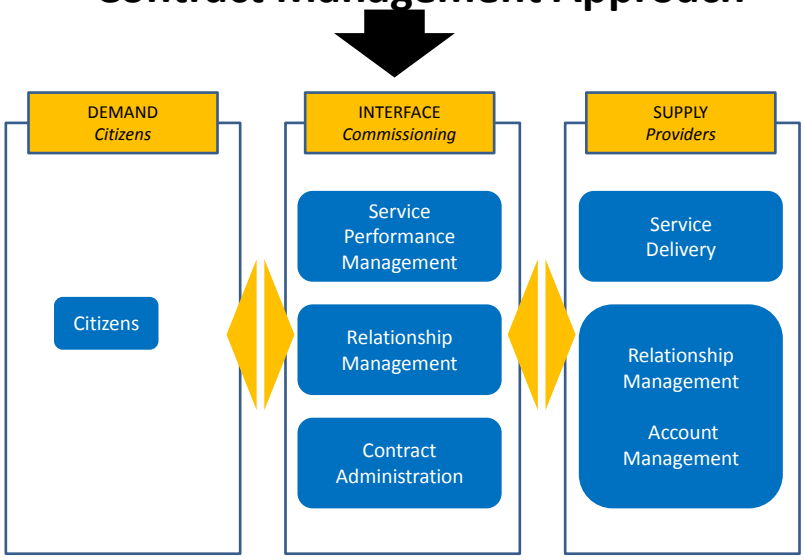
Contract= Agreement + Legality

Elements of Contract

- Offer and Acceptance
- Consideration
- Capacity to contract
- Lawful purpose
- Possibility to performance
- Free consent
- Legal relationship
- Two or more Parties
- Written

16

Contract Management Approach



Tender:

Offer by the Bidder to execute some Specified work or supply goods at a certain rate within fixed time frame as per agreement.

Tendering (Bidding) Process

1. Invitations for bidders,
2. Bids distribution,
3. Instruction to Bidders,
   a. General,
   b. Bidding document,
   c. Submission of bids,
   d. Bid opening and evaluation,
   e. Award of contract,
   f. Bidding data,
4. Forms of bid, qualifications, information, letter of acceptance and agreement,
   Standard forms:
   - Contractor's bid,
   - Qualification,
   - Letter of acceptance,
   - Agreement
5. Conditions of contract
   - General,
   - Times control,
   - Quality control,
   - Cost control,
   - Finish the contract,
6. Specifications,
7. Drawings,
8. Bill of qualities,
9. Security forms
   - Bid security,
   - Performance bond,

Performance Bank guarantee
Bank Guarantee for Advance Payment

18

Why Tendering

- **To Select Best Contractor**
- **To get Quality work**
- **To get work at Competitive Price**
- **To maintain Transparency**
- **Public Private Partnership (Encourage Contracting Procedure)**

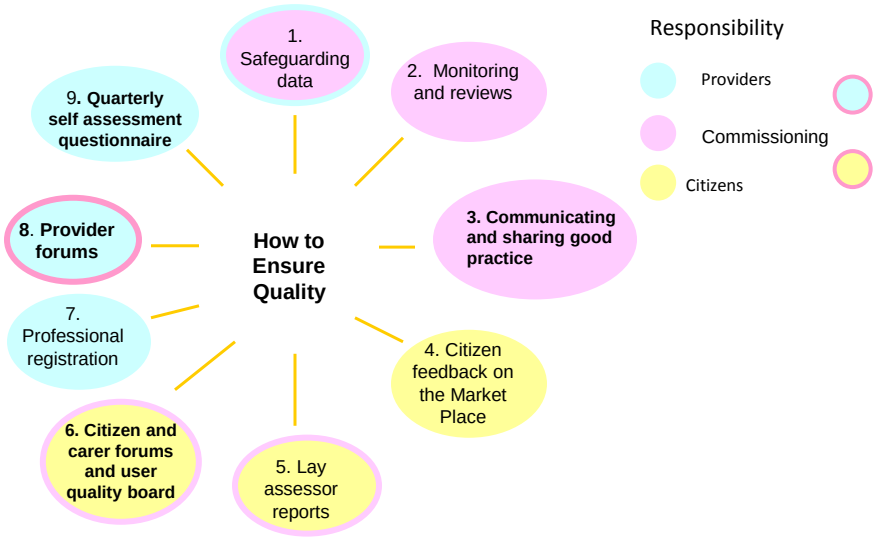
Usage of Tender

Single Stage Single Envelope Bidding Procedure

Single Stage Two Envelope Bidding Procedure

19

How do we measure quality?



Preparation Before Tender

- **Project Preparation- Feasibility Study**
- **Estimating of Quantity**
- **Cost Estimating**
- **Approval of Estimate**
- **Resource Planning**
- **Tender Document Preparation**

21

Bidding Document

- **Plan, Drawing of the Planed Work**
- **Bill of Quantities**
- **Quantities of Goods**
- **Work to be done**
- **Time of supplying and work completion**
- **Provision of Warranty, Repair and Maintenance**
- **Additional Training and Supervision required**
- **Financial requirement, advance, payment, etc.**
    - **Bid Security**
    - **Performance Security**

22

E-Bidding

Online Bidding for online market place.

WHAT are the Signification and Importance of

E- Bidding ?

Assignment-1

23

Priority of Document

- **Contract Agreement**
- **Letter of Acceptance**
- **Contractor's Bid**
- **General and Special Conditions of Contract**
- **Specification**
- **BOQ**
- **Addenda**

24

Factor For Consideration of Contract Document

- **Clear and Fair**
- **Consistent Language**
- **No repetition but retrievable**
- **Use Foresight- for possible confusion**

25

Type of Contract

- **Unit Rate Contract**
- **Lump Sum Contract**
- **Design Build Contract**
- **Turn Key Contract**
- **EPC Contract**
- **Cost- Reimbursement Contract**
- **Time and Material rate Contract**
- **Management contract**
- **Piece work Contract**
- **Build Own Operate Transfer Contract**

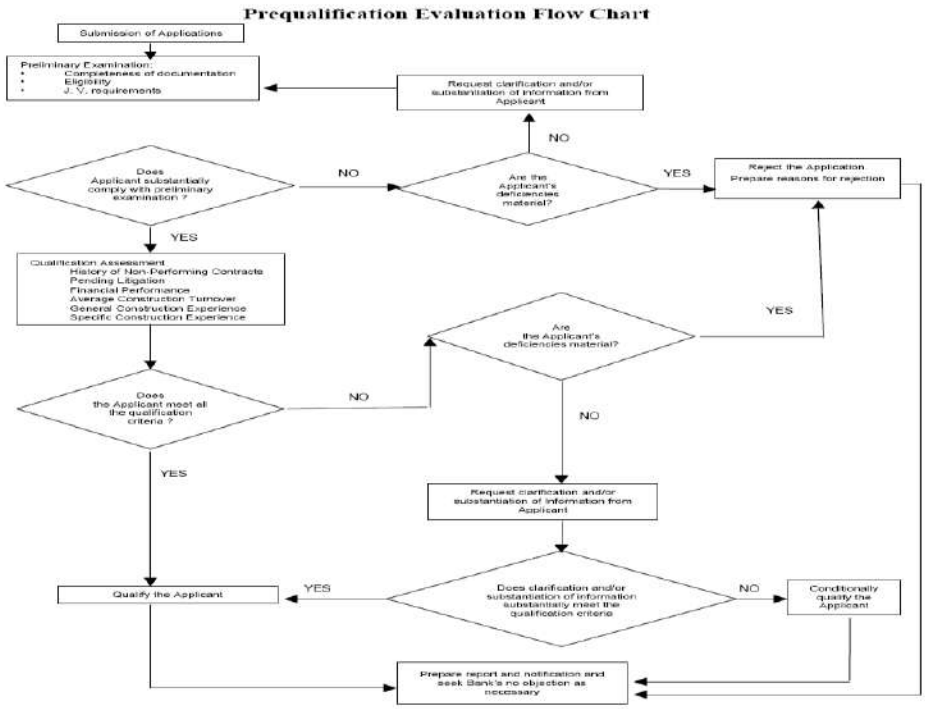
26

Pre-Qualification

Capability assessment of firms to carry out a particular contract **prior** to being invited to submit a bid is a process called **prequalification**

- **Experience and past performance**
- **Capabilities (Financial, Personal, Equipment and Technology)**
- **Financial Position**
- **Litigation history**

27



Pre-Qualification

ADVANTAGES

- Enhances participation of serious contractors
- Reduces high cost of bidding
- Gives early warning of competition potential
- Reduces complaints of disqualified bidders
- Borrower able to assess interest of qualified firms
- Identifies potential conflict of interest (contractors with business association with consultants)
- Reduces time in evaluating bids from unqualified bidders
- Reduces potential for controversy
- Early Detection of Employer's capacity to manage procurement

DISADVANTAGES

- Increases procurement lead time
- Review of all application is mandatory whereas post-qualification requires review of only winning bid
- Possibility of collusion

Miscellaneous Terms

- *Expression of* Interest
- *Request* for Proposal
- Joint Venture
- *Liquidated* Damage – Around 0.05 % per day
- Price Adjustment
- *Variation* Order
- *Advance Payment*
- Contingency
- *Pre-Bid* Meeting
- *Bid Opening*
- Bid Evaluation

30

Chapter 5

Regulatory Environment

Intellectual Property Rights

- Right related to Patents, Design, Trade-Marks and Copyright.
- Right on own Creation/Innovation such as Music, Product, Film, Brand name, etc.

Copy Right

- Right conferred on the owner of a literary or artistic work to produce or reproduce the work

Areas

Credited Unchanged

Ownership, reproducing and distribution

Display and performance

Income and Compensation

Legal Liabilities

License of Copyright- owner property

Work

such as book, music, literature work, cinema, design, etc

3

Trademark

Mark that is used for the purpose of distinguishing goods and service product or system.

It may be word, symbol, picture or combination of it.

Design Right

Any design, form shape, of materials made through the preparation of any method.

Income and Compensation

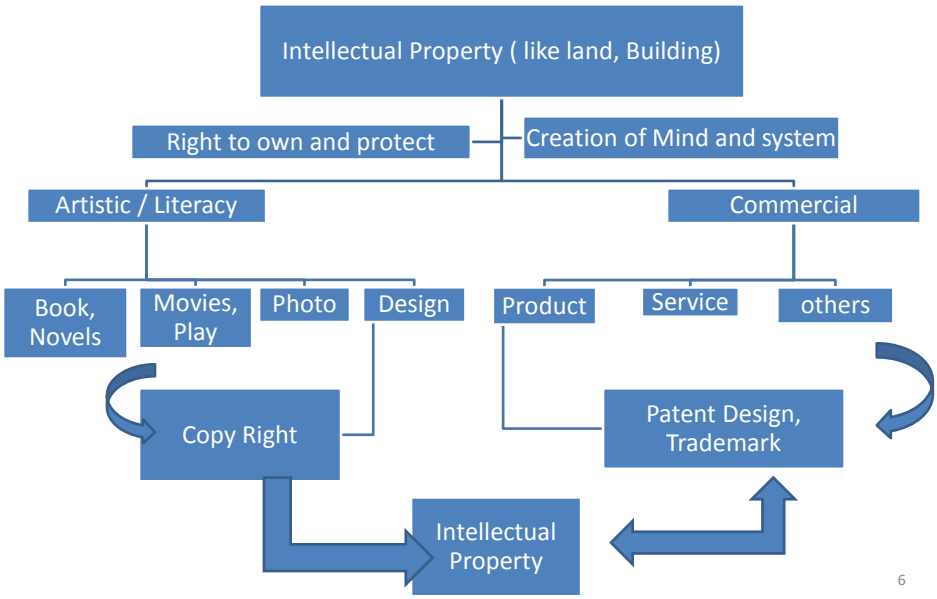
4

Patents

- Right related to new invention/innovation.
- A new method or process of the construction operation or publicity of any materials or collection of it through any principle formula.

5

Intellectual Property Right



6

Nepal Engineering Council Act

Labor Law

Building Code and Bylaws

Company Registration

Chapter 6

Contemporary Issues in Engineering

Globalization and Cross Culture Issues

- Process of extending relationship across world. (Such as in terms Economics, Culture, Technology, etc)
- **Globalization** deals with (as per International Monetary Fund)
  - Trade and Transactions
  - Capital and Investment
  - Migration and movement
  - Dissemination of Knowledge

Public Private Partnership (PPP)

- Contractual agreement between Public Entity and Private Partners for delivery of infrastructure or service of public interest.

PPP For

Risk management or minimization

Value for money maximization

Equal Participation **Public and Private**

Public – Output (Outcome and Impact) and

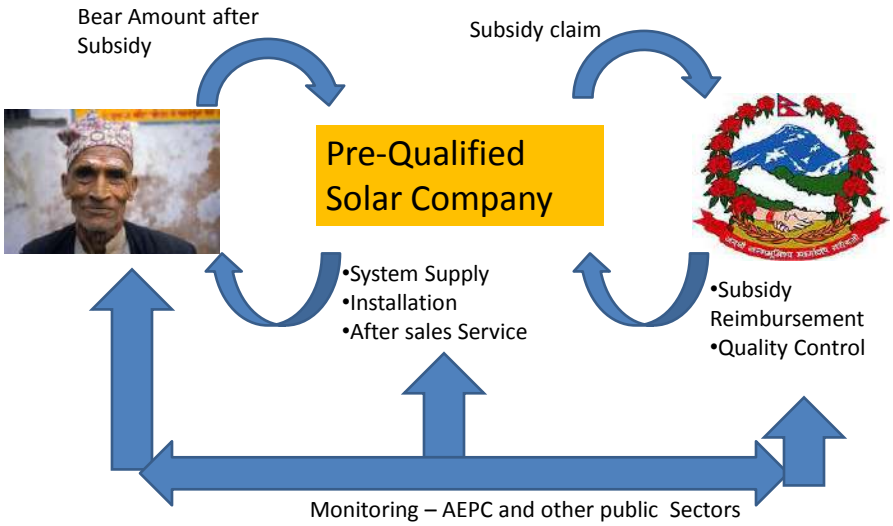
Private – Input (working partners and implementer)

Importance of PPP- means of mainstreaming Economic activities

PPP Model in Nepal

3

PPP model for RE Promotion in Nepal



Safety Risk and Benefit Analysis

Safety is the state of Being Safe in terms of Physical, social, Spiritual, financial, political, emotional, psychological, etc.

Safety first or safe way is the best way

What is Risk?

The probability that a particular threat will exploit a particular vulnerability

- Need to systematically understand risks to a system and decide how to control them.

5

Risk

The probability of suffering a harm or loss. It is a combination of hazard and Probability

- Risk = Probability of occurrence of hazard X magnitude of hazard

- Type of Risks
  - Background risk
  - Incremental risk
  - Total risk
- Measurement of Risk
  - Individual Risk
  - Societal Risk

Individual Risk

- Risk posed by an individual
  - It is generally measured in time domain for a particular type of hazard.
  - Risk of Death due to fire in an industry = 1.0E-05 /yr

Societal Risk

- Risk for a group of people
  - It is measured in terms of number of people poses particular risk for a given period of time.
  - Risk of Death to 10 workers due to fire in an industry = 1.0E-09 /yr/10 persons

Acceptable Risk

- Risk that's acceptable to regulatory agency and also to the public
- **Level of Risk of Death Per Year (voluntarily acceptable by public)**
  - Smoking 30 cigarettes per day 1 in 200
  - Man aged 35-44 1 in 600
  - Motor Vehicle Accident 1 in 10 000
  - Accident at home 1 in 12 000
  - Rail accident 1 in 420 000

What is Risk Analysis?

- The process of identifying, assessing, and reducing risks to an acceptable level
  - Defines and controls threats and vulnerabilities
  - Implements risk reduction measures
- An analytic discipline with three parts:
  - Risk assessment: determine what the risks are
  - Risk management: evaluating alternatives for mitigating the risk
  - Risk communication: presenting this material in an understandable way to decision makers and/or the public

Benefits of Risk Analysis

- Assurance that greatest risks have been identified and addressed
- Increased understanding of risks
- Mechanism for reaching consensus
- Support for needed controls
- Means for communicating results

Basic Risk Analysis Structure

- **Evaluate**
  - Value of computing and information assets
  - Vulnerabilities of the system
  - Threats from inside and outside
  - Risk priorities
- **Examine**
  - Availability of security countermeasures
  - Effectiveness of countermeasures
  - Costs (installation, operation, etc.) of countermeasures
- **Implement and Monitor**

Quantitative Risk Analysis

- Generally used in Information Security
  - Hard to make meaningful valuations and meaningful probabilities
  - Relative ordering is faster and more important
- Many approaches to performing qualitative risk analysis
- Same basic steps as quantitative analysis
  - Still identifying asserts, threats, vulnerabilities, and controls
  - Just evaluating importance differently

Example 10 Step QRA

- Step 1: Identify Scope
  - Bound the problem
- Step 2: Assemble team
  - Include subject matter experts, management in charge of implementing, users
- Step 3: Identify Threats
  - Pick from lists of known threats
  - Brainstorm new threats
  - Mixing threats and vulnerabilities here...

14

Step 4: Threat prioritization

- Prioritize threats for each assert
  - Likelihood of occurrence
- Define a fixed threat rating
  - E.g., Low(1) … High(5)
- Associate a rating with each threat
- Approximation to the risk probability in quantitative approach

15

Step 5: Loss Impact

- With each threat determine loss impact
- Define a fixed ranking
  - E.g., Low(1) … High(5)
- Used to prioritize damage to asset from threat

16

Step 6: Total impact

- Sum of threat priority and impact priority

Threat	Threat Priority	Impact Priority	Risk Factor
Fire	3	5	8
Water	2	5	7
Theft	2	3	5

17

Step 7: Identify Controls/Safeguards

- Potentially come into the analysis with an initial set of possible controls
- Associate controls with each threat
- Starting with high priority risks
  - Do cost-benefits and coverage analysis (Step 8)
  - Rank controls (Step 9)

18

Step 10: Communicate Results

- Most risk analysis projects result in a written report
  - Generally not read
  - Make a good executive summary
  - Beneficial to track decisions.
- Real communication done in meetings an presentations

19

Insurance

- Equitable transfer of Risk of a loss from one entity to another in exchange.
- Insurance is a financial intermediary for possible losses
- Assurance of effective and quality output with possibility of compensation in alternative form.

20

SWOT Analysis

- SWOT is actually an acronym for Strengths, Weaknesses, Opportunities, and Threats.

- SWOT could be defined as follows:

  - Strengths: What does the organisation do well?
  - Weaknesses: What is wrong now?
  - Opportunities: What possibilities exist?
  - Threats: What can go wrong?

The purpose of SWOT Analysis

- It is an easy-to-use tool for developing an overview of a situation
  - It forms a basis for matching your strategy to its situation
- Strengths and weaknesses are generally **internal** factors that are within your control.
- Opportunities and Threats are generally **external** issues that you can't control.

Conducting a SWOT analysis

There are eight steps required to complete a SWOT analysis and create a SWOT matrix (also known as a TOWS matrix).

1. List external opportunities
2. List external threats.
3. List internal strengths.
4. List internal weaknesses.
5. Match internal strengths with external opportunities and list the resulting Strengths-Opportunities strategies in the matrix chart.
6. Match internal weaknesses with external opportunities and list the resulting Weaknesses-Opportunities strategies.
7. Match internal strengths with external threats and list the resulting Strengths-Threats Strategies.
8. Match internal weaknesses with external threats and record the resulting Weaknesses-Threats Strategies.

At this point in the process, you'll have a significant list of potential strategies. You'll need to weigh the impact of the various factors in your analysis and select the most feasible strategy to implement. Ideally, you'll select a SO strategy, but often you'll need to implement one of the other three types of strategies to overcome a weakness or address a threat before being in a position to implement a S-O strategy.

The SWOT Analysis – a Check list of What to Look for

Potential Internal Strengths	Potential Internal Weakness
• A distinctive competence? • Adequate financial resources? • Good competitive skills? • Well thought of by buyers? • An acknowledged market leader? • Well-conceived functional area strategies? • Competitive advantages • Product innovation abilities? • Proven management? • Insulated from strong competitive pressures? • Others?	• No clear strategic direction? • A deteriorating competitive position? • Obsolete facilities? • Lack of managerial depth and talent? • Poor track record in implementing strategy? • Falling behind in R& D? •Too narrow market image? • Higher unit costs relative to key competitors? • Others?

The SWOT Analysis – a Check list of What to Look for

Potential External Opportunities	Potential External Threats
• Changes in technology on both a broad and narrow scale • Changes in local or state policies • Changes in social patterns, population profiles, lifestyle changes, etc. • Local events	• What obstacles do you face? • What is your competition doing? • Are the required specifications for your job, products or services changing? • Is changing technology threatening your position?

Strengths of Nepal

- **Favorable climate**
- **Manageable size of population and country**
- **Ability of people to acquire or learn new skills and techniques**
- **Increased awareness for enterprise promotion or development**
- **Available local expertise or human resource capacity for economic Management**
- **Hard-working people**

Weaknesses

- **Excessive political influence in economic decision-making**
- **Weak political will to take critical economic decisions**
- **Weak policy formulation and implementation capacity**
- **Poor exploitation and utilisation of natural resources**
- **Inadequate capacity to protect and surveillance natural resources**
- **High donor dependence**
- **Pull-Him/Her-Down (PHD) Syndrome**
- **Poor security network**
- **Weak industrial and technological base and low capacity for added value**
- **Poor maintenance culture**
- **Ineffective enforcement of law**
- **Over-centralisation of institutions and Weak local government institutions**
- **High level of corruption and mismanagement**
- **Poor public sector incentives or remuneration**
- **Weak competitiveness**
- **Low domestic savings and investment**

Opportunities

- **New Nepal Slogan**
- **Foreign direct investment**
- **Regional economic integration**
- **Donor support and goodwill**
- **Globalization (favorable policies and programs)**
- **External training or capacity building opportunities in economic management**

Threats

- **Erosion or loss of private sector confidence in the economy, particularly foreign investors**
- **Donor fatigue/erosion of donor confidence**
- **National, regional and global insecurity or instability**
- **Globalization (unfavorable policies and programs)**
- **Smuggling, capital flight and money laundering**
- **Unhealthy or unfavorable global trade and industrial competition**
- **Brain drain**

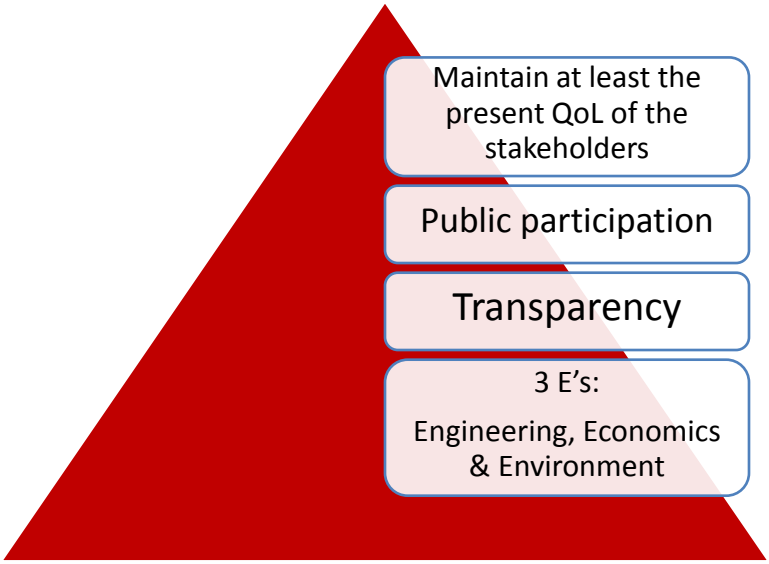
Development and Environment

- Process of Positive Change
- Sustainability and Growth

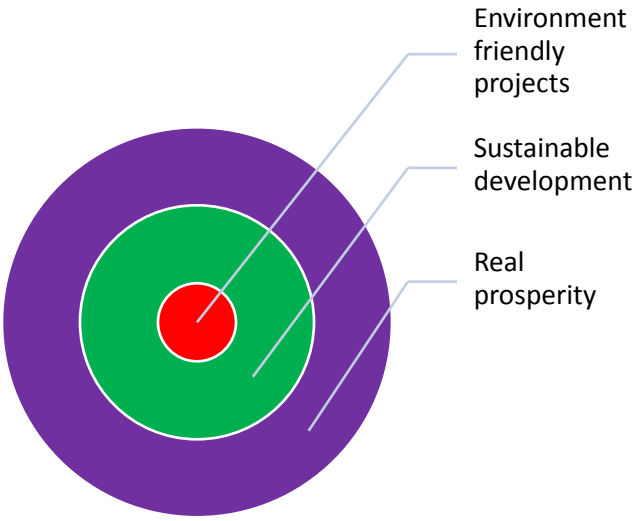
Initial Environment Examination (IEE)

Environment Impact Assessment (EIA)

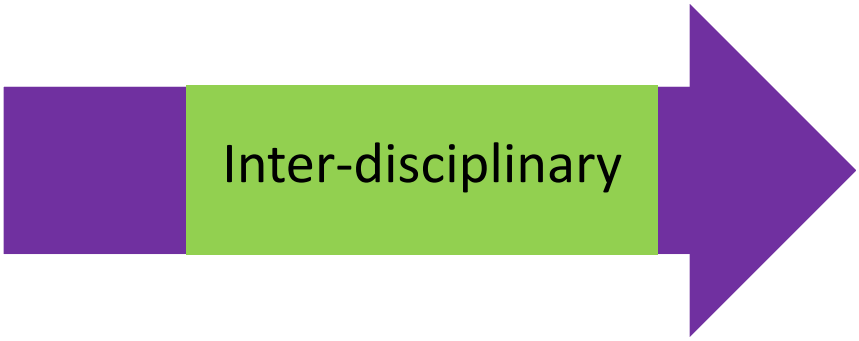
Principle



Aim



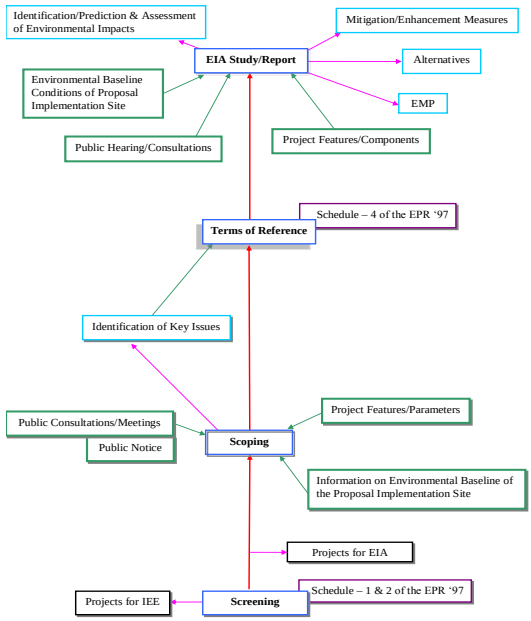
Approach



Key elements

- ☐Identification of genuine & valid issues
- ☐Description of the proposal
- ☐Baseline information on existing environment of proposal implementation site
- ☐Identification/prediction of impacts and evaluation of their significance
- ☐Adverse impact mitigation measures/Benefit enhancement measures
- ☐Environment management plan
- ☐Analysis of alternatives
- ☐Feedbacks from public concerned/stakeholders

Schematic of the EIA Method



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Baseline information (cont'd.)

- Socio-economic environment
  - Demography
  - Economic activities/General indication of level of affluence
  - Key local products
  - Access to market & credit facilities
  - Literacy level
  - General price level of key commodities
  - Women/children
  - Vulnerable segment of local populace

36

Baseline information (cont'd..)

- Biological environment
  - Forest resources
  - Rare/endangered species of plants
  - Plant species of religious/medicinal/commercial values
  - Wild animals & their habitat
  - Rare/endangered species of animals
  - Community forests
  - Local dependence on forest resources (Timber/Non-timber) for livelihood

37

Baseline information (cont'd.)

- Cultural environment
  - Temples/Gumbas/Mosques
  - Places of historic/cultural significance
    - Local significance
    - Regional significance
    - National significance
  - Cemetery/Ghats
  - Historic/cultural monuments

38

Mitigation Measures

- Impact-wise MM's with indicative costs
- Avoidance, Corrective or Compensatory

39

Alternative Analysis

- ❖Design
- ❖Project site
- ❖Technology, procedure of operation, time-schedule and raw materials to be used
- ❖Environment management system
- ❖Whether or not the risks resulting from the proposal can be accepted
- ❖Other matters

40

Environmental Management Plan

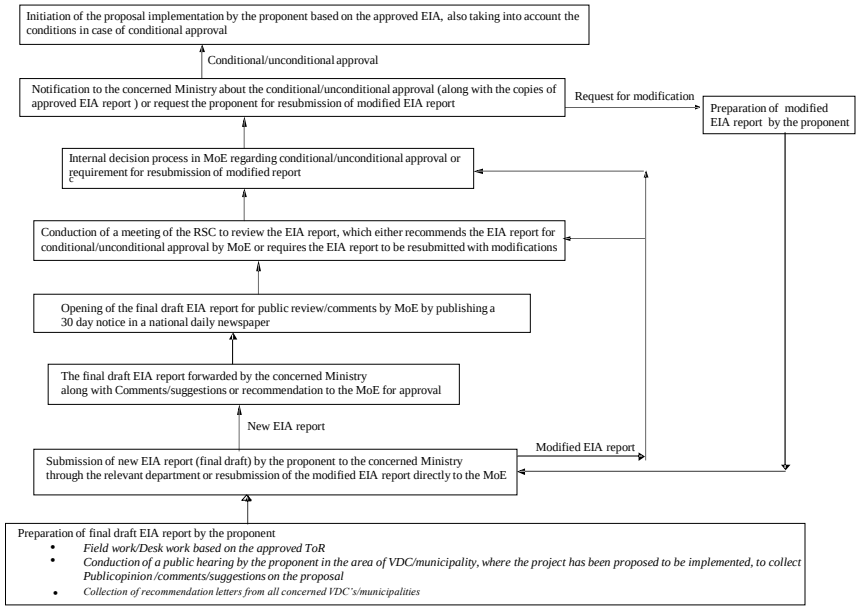
"A plan to ensure systematic integration of all proposed mitigation measures with the project construction/operation activities"

EMP: Objectives

- Formulate project management activities in particular the implementation of EPM's
- Formulate a monitoring programme for baseline, impact and compliance monitoring
- Formulate an environmental auditing programme to be implemented after project construction

EPM's: Environment Protection Measures

EIA Report Approval Procedure



Comparison between IEE & EIA

	IEE	EIA
Screening criteria	Schedule-1 of EPR, 1997	Schedule-2 of EPR, 1997
Scoping	Not required	Required
Terms of Reference	Required	Required
Public hearing	Not required	Required
Recommendations of concerned VDC's/Municipalities	Required	Required
Open EIA/IEE report for public review/comments	Not required (However, publication of a 15 day public notice in a national-level daily newspaper and posting of the same in the project implementation area for soliciting suggestions/concerns of all stakeholders is a must before report finalization)	Required
Review by committee of experts	Not required	Required
Approving agency	Concerned agency	MoE
Deadline for approval	Within 21 days of receipt of the report in the concerned agency	Within 60 to 90 days of receipt of the report in the Ministry
EMP	Not required	Required

Conflict and Dispute Management

- Dispute is a one sided declaration of right, claim or demand.
  it may be in the form of
  - **Cost in time, money and opportunity**
  - **Image and behaviors**
  - **Employment**
  - **Cash flow, etc.**
- Conflict is harmful activities between two person, group, organization, etc.
  Resolution of Conflict
  - **Avoidance (ignoring)**
  - **Containment (Bargaining)**
  - **Confrontation (face to face solution)**

45

Thanking You

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46