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B.E. (Electronics)

MANAGEMENT INFORMATION SYSTEMS Sem - A

(404210) (2003 Course)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates :

1) *Answer any 3 questions from each section.*
2) *Answers to the two sections should be written in separate books.*
3) *Neat diagrams must be drawn wherever necessary.*
4) *Figures to the right indicate full marks.*

SECTION - I

Q1) a) "The fact that MIS is an integrated system does not mean that it is a single, monolith structure; rather it means that the parts fit into an overall design."

Within above framework, describe the structure, components and nature of information processing that characterize a MIS. **[8]**

b) "This example is from the computer disk drive industry. From mid-70s to 1990, disc drive diameter has reduced from 14-inch to 8-inch to 5.25-inch to 3.5-inch to 2.5-inch. We address our attention to change through 1978-80 from 14-inch diameter disc market to 8-inch diameter disc market. Why did companies manufacturing former loose the market?

The 14-inch drive makers were not toppled by the 8-inch business entrants because of technology. The 8-inch products generally incorporated standard off-the-shelf components, and when those 14-inch drive makers that did introduce 8-inch models got around to do so, there products were very performance-competitive in capacity, areal density, access time, and price per megabyte. But the leading 14-inch drive makers were unable to launch their 8-inch drive products until it was too late and in the end they went out of markets? Why?

In fact their failure to do so resulted from delay in making strategic commitment to enter the emerging market in which 8-inch drives initially could be sold. Research shows established 14-inch drive manufacturers were held captive by their customers. About utility and demand of their 8-inch drive discs, the incumbent companies were seeking feedback from their established customers and they were showing no interest.

Strategic decision by incumbents to continue with 14-inch drive products and starve resources for 8-inch drive product was at operations level perfectly rational but strategically disastrous."

By critically analyzing above example, explain open and closed systems? How do they differ? What is it that open systems must control and to what purpose? If useful, you may refer to Figure (2). **[8]**

OR

Q2) a) "For those in the knowledge business who fail to embrace personal multimedia, punishment can be swift. *Encyclopedia Britannica* published the best-selling encyclopedia in the world for over 200 years. But in one year, 1994, it slipped to number three. But it wasn't the company's traditional competitors, such as Colliers or World Book, which knocked *Encyclopedia Britannica* of its pedestal. It was competitors, namely, Microsoft and Grolier, who brought in to market new encyclopedias on CD-ROM that destroyed *Encyclopedia Britannica's* business.

Further, real blow was given by ushering in of a PC - a multimedia computer. Soon everyone was buying a multimedia computer, not just the CD encyclopedia.

In response, *Britannica* has taken a bold step. It has taken the next logical step and put its encyclopedia on the Net, charging fee for those who "subscribe". The set of books has become a subscription service. Now the encyclopedia on the Net can be updated hourly. Also, because it is on the Net, Britannica has become something much greater than an encyclopedia. There are "hot links" enabling the "reader" to instantly link to related subjects contained on other Web servers around the world. For example, a certain reference to an obscure technique may be hot-linked to another computer where the actual recording of application of that technique may be contained. *Britannica* now has a business model, whereby it can become a directory to all human knowledge that is electronically stored."

With the help of Figure (1), critically analyze business transformation at *Encyclopedia Britannica* for business implications of rise of convergence technology. What does it mean for business information system design? **[8]**
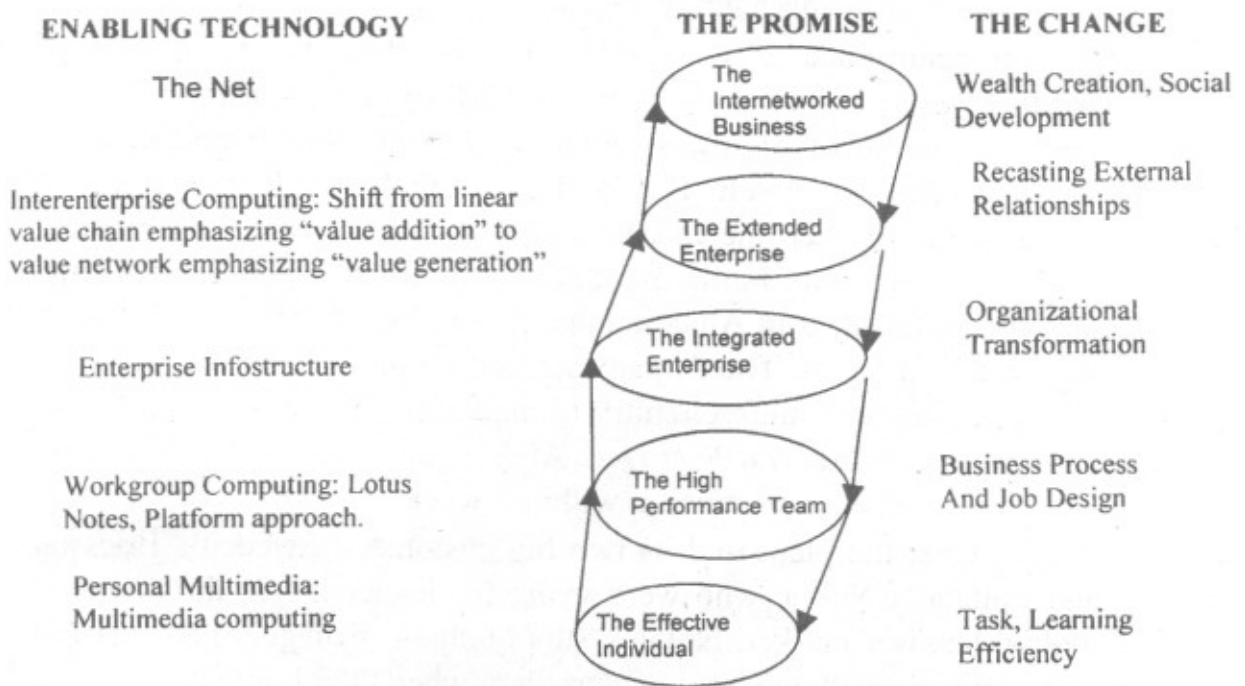
ENABLING TECHNOLOGY	THE PROMISE	THE CHANGE

The Net

Interenterprise Computing: Shift from linear value chain emphasizing "value addition" to value network emphasizing "value generation"

Enterprise Infostructure

Workgroup Computing: Lotus Notes, Platform approach.

Personal Multimedia: Multimedia computing

- The Internetworked Business
- The Extended Enterprise
- The Integrated Enterprise
- The High Performance Team
- The Effective Individual

Wealth Creation, Social Development

Recasting External Relationships

Organizational Transformation

Business Process And Job Design

Task, Learning Efficiency

Fig. (1): Business Transformation Through Convergence Technology

b) What do you understand by the term "information avalanche". Discuss the implications of the convergence technology for the "information avalanche". **[8]**

Q3) a) "It is to deal with the complexity of their environments that organizations develop systems. It is to reduce uncertainty about the environment that the systems originate information, which in fact is a multistage, dynamic decision-making process."

Within above framework, write short notes on any two of the following (To answer you may refer to Figures (2) and (3)) :

i)   Shift *from* a fixed product design information decision to a flexible product design information decision.

ii) Shift *from* decision-making under constraints *to* decision-making under opportunities.

iii) Shift *from* data storage and retrieval *to* information evaluation, storage and retrieval.

iv) List the multistage dynamic decision stages constituting the information origination a system undertakes to reduce the uncertainty it (system) experiences about the environment.

[8]

b) Consider a following handset lunching competitive situation:

"Supply chain management (SCM) processes have their inadequacies and they result in loss of integrity in SCM leading to business loss. A classic example involving Sweden's Ericsson and Finland's Nokia illustrates this very well. In March 2000 in New Mexico a bolt of lightning hit a power line and the temporary loss of electricity resulted in the cooling fans being knocked out in a furnace at a Philips semiconductor plant in Albuquerque. A fire started, but was put off by staff within minutes. The damage seemed minor: eight trays of wafers containing the miniature circuitry to make several thousands chips for mobile phones had been destroyed. After a good clean-up, the company expected to resume production within a week.

That is what the plant told its two big customers, Sweden's Ericsson and Finland's Nokia, who were vying for leadership in the booming mobile-handset market. Nokia's supply-chain managers had realized within two days that there was a problem when their computer systems showed some shipments were being held up. Delays of few days are common. But whereas Ericsson was content to let the delay take its course, Nokia immediately put the Philips plant on a watchlist to be closely monitored in case things go wrong.

They did. Semiconductor fabrication plants have to be kept closely clean, but on the night of the fire, when the staff were rushing around and firemen were tramping in and out, smoke and soot had contaminated a much larger area of the plant than had first been thought. Production could be halted for months. By the time the full extent of the disruption became clear, Nokia had already started locking up all the alternative sources for the chips. That left Ericsson with a serious parts shortage. The company, having decided some time earlier to simplify its supply-chain by single-sourcing some of its components, including the Philips chips, had no Plan B. That severely limited its ability to launch a new generation of handsets, which in turn contributed to huge losses in the Swedish company's mobile-phone division. In 2001 Ericsson decided to quit making handsets on its own. Instead, it put that part of its business into a joint venture with Sony."

i)   With the help of the example explain difference between an observed error and an information error?

ii) What is the information-processing flaw *here*?

iii) Is there a loss of decision integrity in this case? Where and how?

iv) Is there a loss of goal integrity? Explain.

v)   For competitiveness in business what was needed?   [8]

Environmental input noise

Parametric noise

η_D : Noise in the form of Delays

η_{SI} : Noise in the form of complex, delayed hardware (communication included) and software errors particularly due to emphasis on system integration

Optimum Input

Business Activity/ Process/ Service

Critical Performance Variables

Measurement noise

Customer: Changing Requirements

$\eta_{SI,D}$

Error /Deviation (e)

(e)

Determining TARGETS
-Standards

Adaptive Learning
-Estimation
-Alternatives
-Decision

Market & Industry

Controls:
-Physical variable control
-Process control [Figure (1)]

-Product Reports
-Bills

Information processing for Diagnosis and Treatment Decision [Figure (1)]:
-Undertaking customized (business-centered) planning & design for *generating business* solution alternatives for evaluation and final choice (selection) of customized (flexible) business service (information) decision for control implementation

Specific/situational Raw Data/ Information– Business records, data, questions - characterized by uncertainty

-Productivity
-Cost efficiency

-Flexible Information Decision for business effectiveness, economy

Continuous product/ service / outcome innovation

Structural Dynamics Information

DDM

-Effectiveness
-Efficiency

Adaptive Learning
-Estimation
-Alternatives
-Decision

Uncertainty in information environment characterized by
-extreme dynamism,
-intense time pressure,
-high complexity, frequent uncertainty,
-palpable risk
-difficulty in
    -appreciating systemic nature of situations,
    -pursuing efforts to know more,
    -relating events/situations from different time intervals
    -recognizing what starts small and comes with delay

η

η Dynamic Decision Making

Information Origination & Processing Stages
-Normative, dynamic decision stages origination maximal information

η

Difficulties & Delays in identifying problem complexity

Business (customer care) Problem / Opportunity Area
-REAL WORLD
    -Complex
    -Ever-changing
    Reality is not passive but to some extent active. This necessarily creates time pressure in information origination and processing.

Legend:
(a) ———— : Feed-Forward Information Line (b) .... : Feed-Back Information Line (c) ➡ : Information Integrity
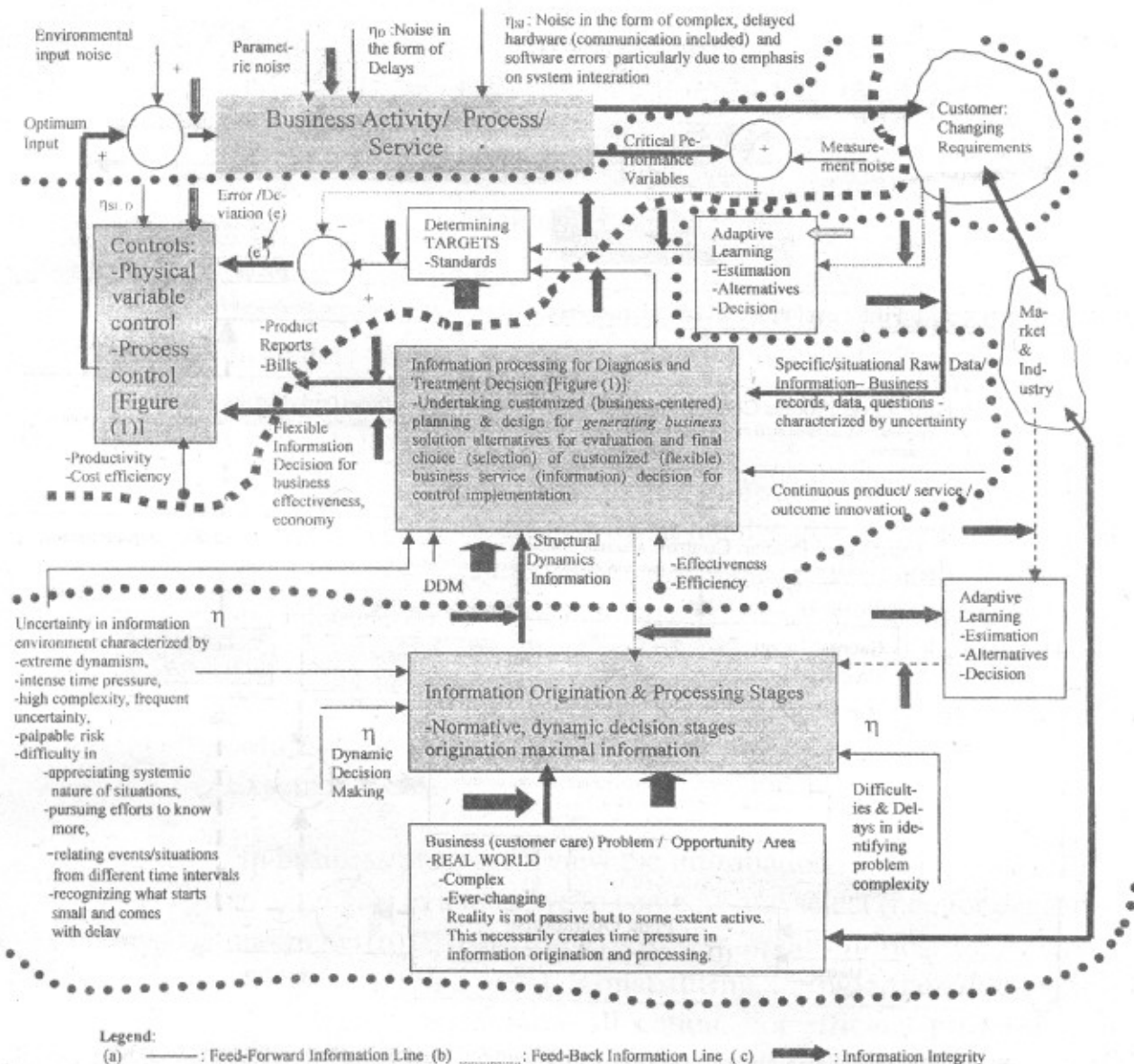
Figure (2) : A systems view of a business process represented as a generic business process *IS* view and as integral part of a closed loop information and control system characterized by continuous information origination and processing in the presence of uncertainty and the emergent all encompassing view of Information Integrity for business competitive advantage.
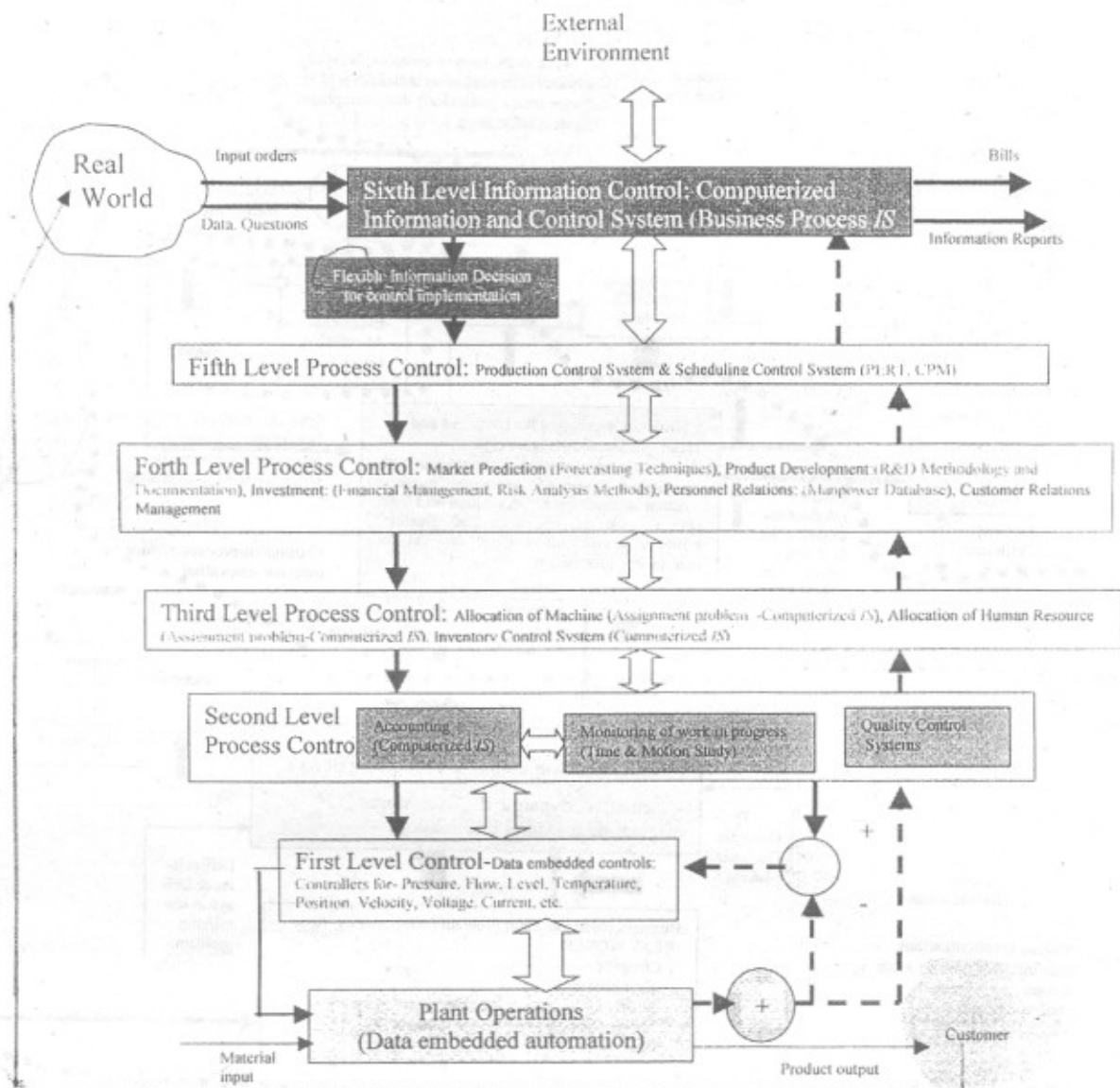
Figure (3): Modeling a business process, with a controls interpretation, as integral to a close loop information and control system

Q4) a) Write short notes on any two of the following (To answer you may refer to Figures (2) and (3)) : **[8]**

    i) "Data and information are different." Explain with the help of an example.

    ii) "With external and internal customer requirements becoming local and instant, a system is emerging to be a potential source of information." Explain.

    iii) In a business IS view, information is function of source, process and "recipient". Explain.

    iv) What do you understand by the terms "observable error" and "unobservable error"? Give an example of an unobservable error? In system failures which type of error dominates?

b) Answer the following: **[8]**

    i) "Given the complex and continuously changing system environment, the assumption that the design data and information once validated is sufficiently perfect and sufficiently complete, and the industry practice that most information processing systems (IS) do not anticipate information error is not acceptable."

    Within above framework, discuss Information Integrity Risk as comprising Information Correctness Risk and Information Exactness Risk.

    ii) "In business process IS view the information "I" comprises (a) I_1 - an aggregate or a measure to compare and select (i.e., for decision-making), (b) I_2 indicating business opportunities, i.e., market imbalances, and (c) I_3 constituting knowledge of working mechanisms for resource allocation. For efficient processing of information, trade off *has* to be between costs associated with originating and processing of information and loss due to incorrect information. Thus the IS which, for a certain kind of information origination, processing, storage, distribution and discard, is able to arrange them (costs) at the lower level *will* tend to prevail."

    Using simple economic argument, explain in brief why for business competitive advantage information {I1, I2, I3}, i.e., information {I}, must have integrity.

Q5) a) i) "Problems that one addresses from the perspective of System Dynamics have two features in common. First they are dynamic, i.e., they involve quantities, which change over time. Second they involve the notion of feedback."

Explain, if possible, with the help of example(s).

ii) Given here is the description of "job backlog-anxiety system" with blanks. Fill in the blanks by putting at the blank indicated by number, the appropriate word from the set of words given at the end of description.

"In a situation of -----(1)----- backlog of work, a larger number of tasks are to be completed, which causes anxiety to -----(2)----- Rise in anxiety makes it -----(3)----- difficult to concentrate and complete any given task. This -----(4)------ the average time to complete a task. This results in -----(5)----- task completion rate, which in turn has the job backlog depleted less rapidly".

Set of words to choose appropriate word to fill in the blank :
{rise, increases, slowing down of, more, high}.

Note : You may write answer by pairing *number* and *word*.

[9]

b) Figure (4) gives a view of problems in a public recreational area system.
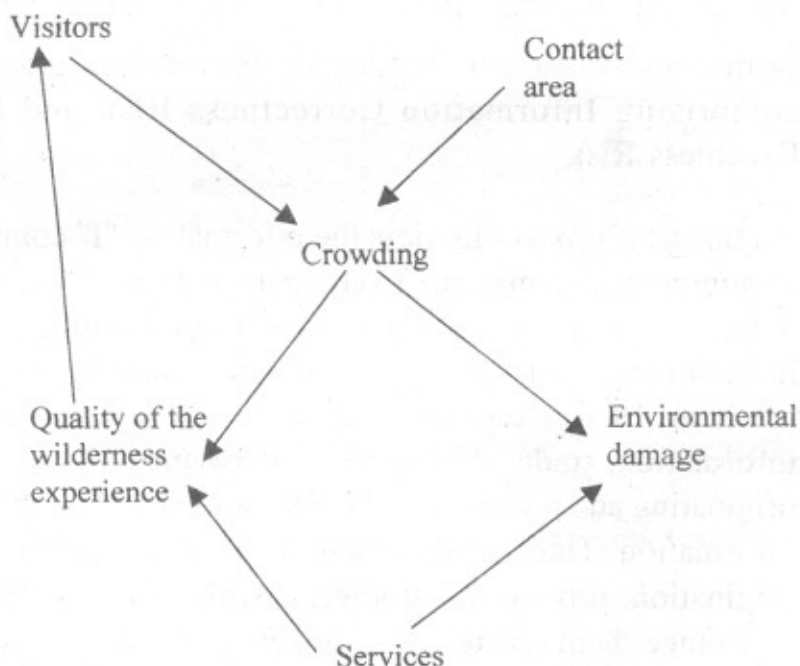
Figure (4): Causal-loop representation of a public recreational area system

i) Show the feedback loop in Figure (4).

ii) Analyze the public recreational area system in Figure (4) if the feedback loop were not to be recognized.

iii) Analyze the problems in public recreational area system when modeled with feedback loop recognized.

[9]

OR

Q6) a) i) What do you understand by following terms? Explain with the help of example(s).

1) Closed System and Open System,

2) Closed Loop and Open Loop.

ii) Based on the causal loop representation of a simple inventory system structure in Figure (5), discuss the terms feedback, feedback structure, and feedback loop system as applicable under System Dynamics methodology.

[9]
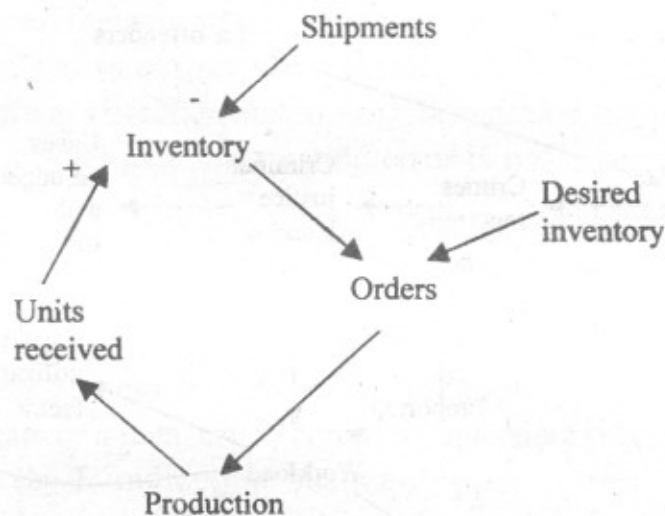
Figure (5): A causal loop representation of an Inventory System Structure

b) "Real problems often become so complex that understanding their behavior and predicting responses to policies are impossible without a formal model."

Explain above observation based on representations of a basic criminal justice system as represented in Figures (6.1) and (6.2). [9]
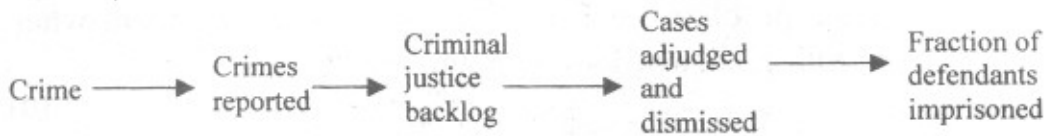
Crime → Crimes reported → Criminal justice backlog → Cases adjudged and dismissed → Fraction of defendants imprisoned

Figure (6.1): A Simple criminal justice system structure

Perceived offenders imprisoned

Ex-offenders imprisoned

Perceived imprisonment ratio

Ex-offenders

Crime → Crimes reported → Criminal justice backlog → Cases adjudged and dismissed → Fraction of defendants imprisoned

Perceived crime

Fraction of crimes reported

Capacity utilization factor

Workload

Capacity acquisition → Criminal justice capacity
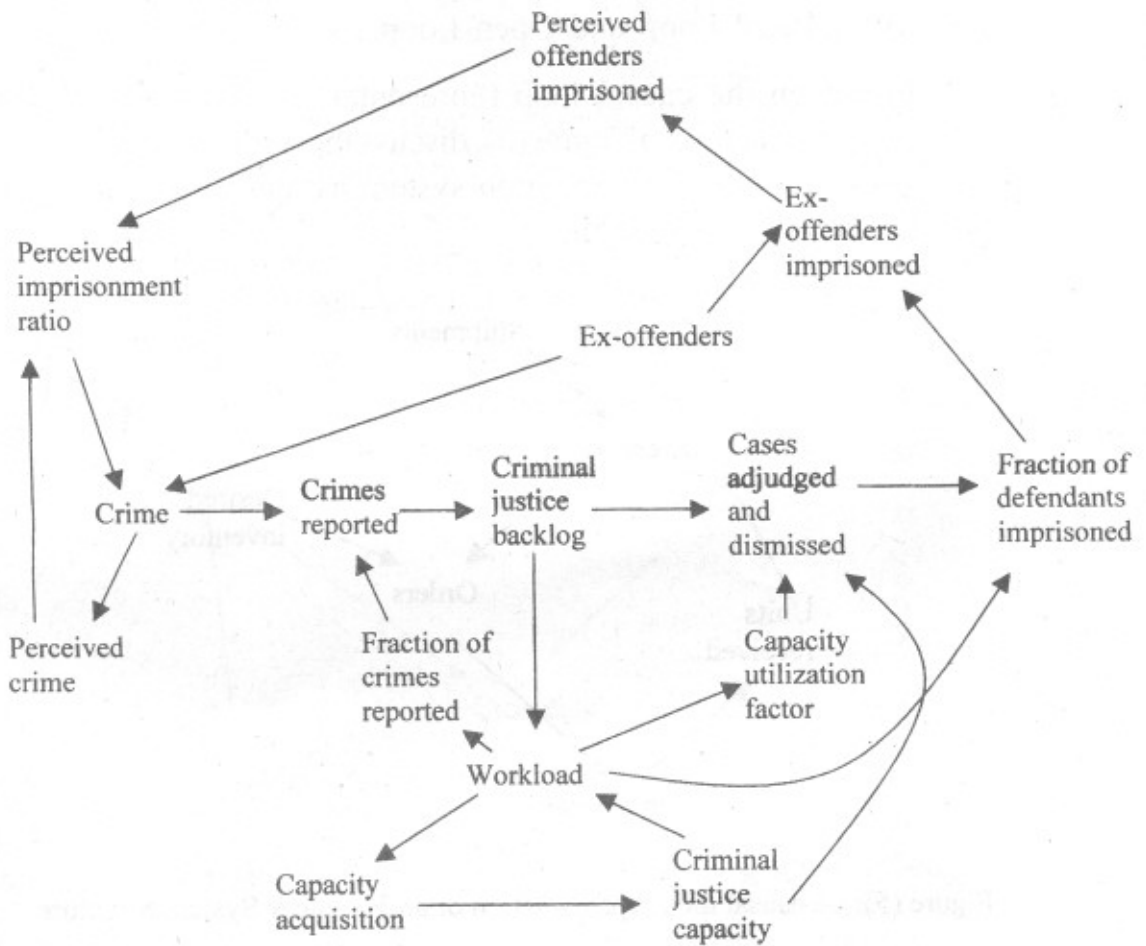
Figure (6.2): A real world basic criminal justice system represented as a feedback structure

Q7) a) "System Dynamics modeling uses causal-loop diagrams. The diagrams are referred as influence diagrams, or, more mathematically, as directed graphs. This is because the individual links (giving variable influence or graph direction) in such diagrams are labeled to show whether the nature of the causal-link is "positive" (+) or "negative" (-)".
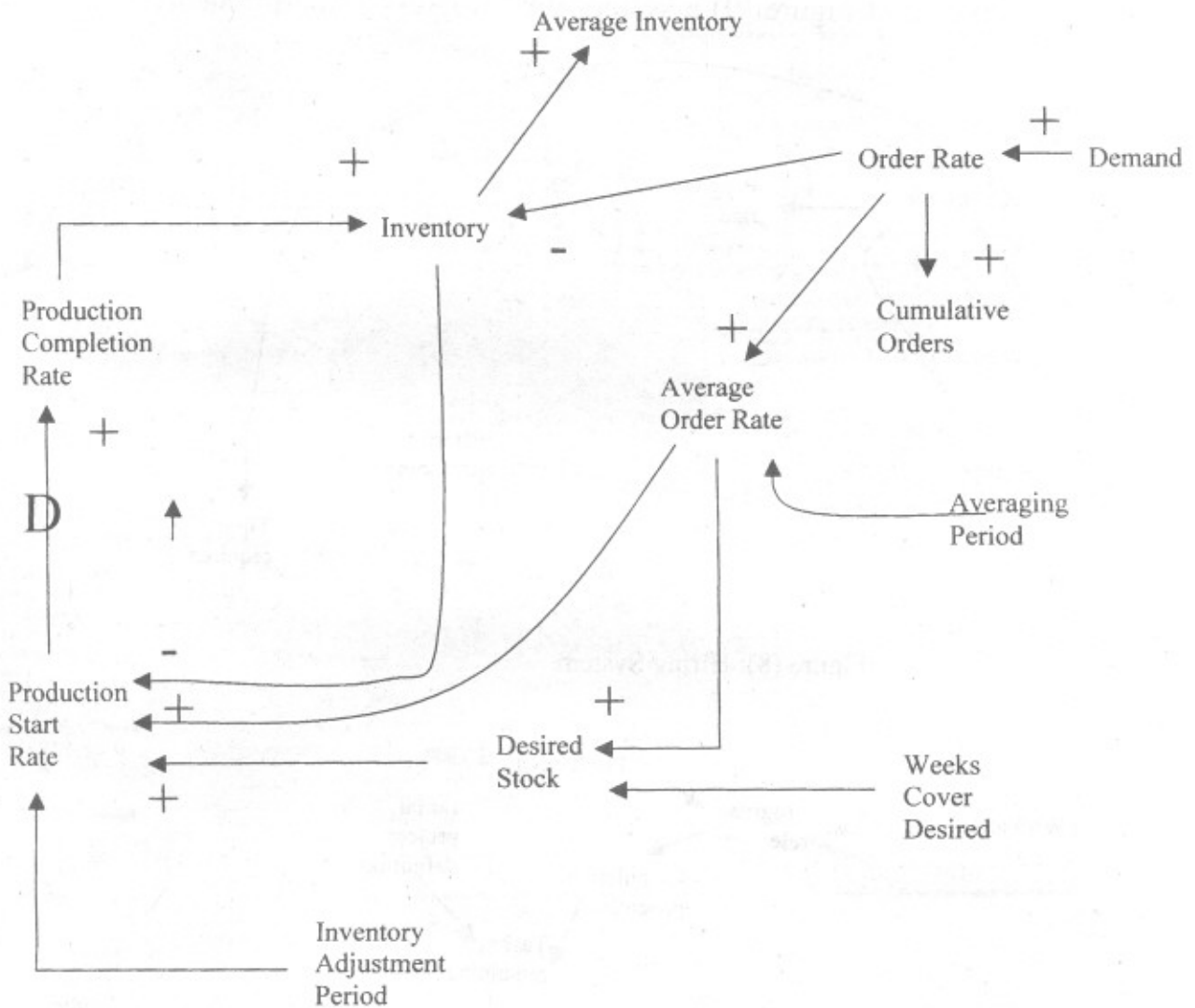

Figure (7): Example of a Production-Inventory System (Model) represented as Influence diagram

Describe in your own words the Production-Inventory System Model in Figure (7). [8]

b) Analyze the production-inventory system model in Figure (7) in Question (7-a) to explain implication of delay, to identify and explain the type of feedback present, and to explain how system is controlling inventory in the wake of demand variations. [8]

Q8) A common problem of large development projects is threefold: (i) cost overruns, (ii) the need to hire and train additional personnel midway through the project, and (iii) overrunning the scheduled time allotted.

For an product/system/service development firm, Figure (8) gives a "hiring (or firing) system" adopted by the development project firm for adjusting workforce and Figure (9) a system for "progress" measurement.
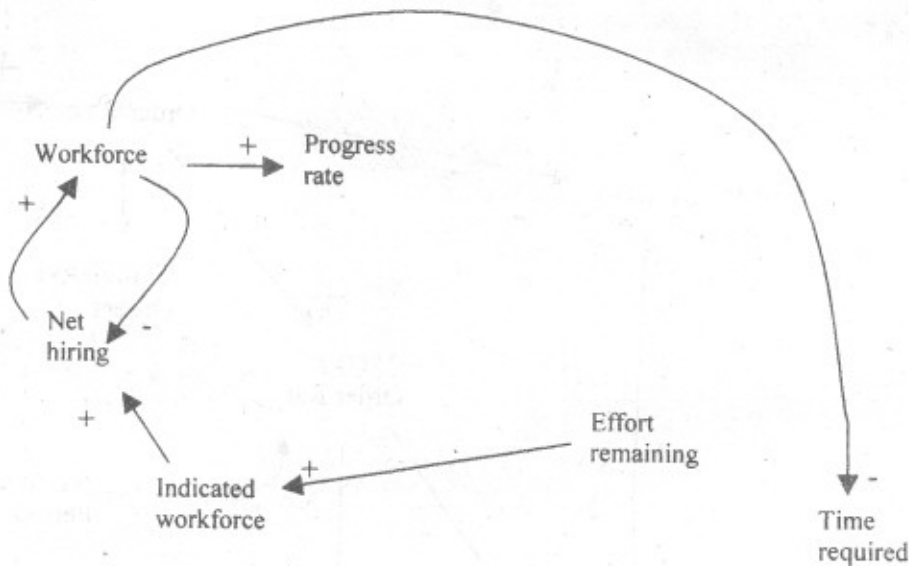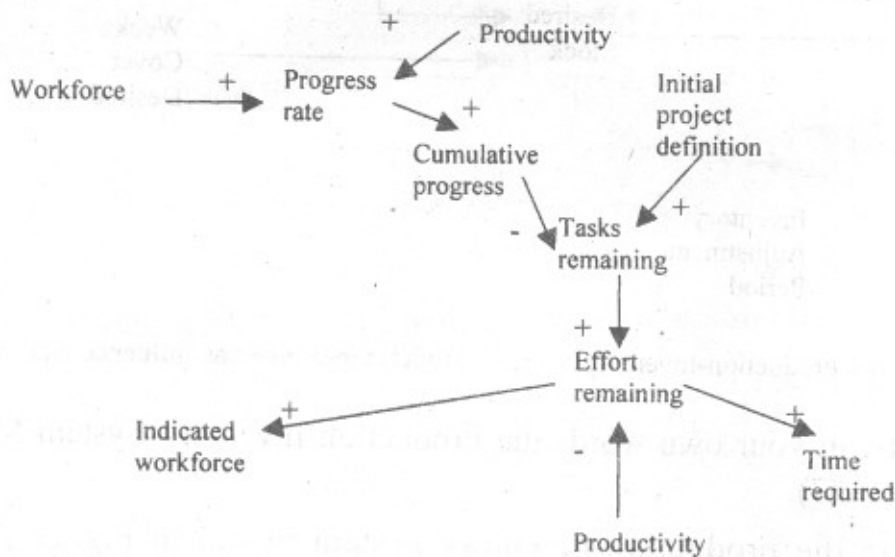

Figure (8): Hiring System

Figure (9): A system for "Progress" measurement

a) Develop a causal-loop model showing an integrated overview of a development project structure. What more can you say about the causal-loop model and the structure? [8]

b) Identify feedback loops in the project structure and explain their nature. Do these feedback loops control the system problems? Explain. [8]

Q9) a) For information envelope briefly describe following information origination processes and indicate uncertainties therein and their integrity implications: [8]

   i) From environmental information variables to their relationships leading to problem information structure model,

   ii) From Problem Information Structure Model to Problem Information Structure Dynamics Model,

   iii) From Problem Information Structure Dynamics Model to Flexible Information Decision,

   iv) From Flexible Design Information Decision to Product/System/ Service Delivery,

   v) From Product delivery to feedback and performance evaluation.

b) "Business IS View comprises multiple decision stages with their uncertainties. Further, each decision stage is an information origination process, which comprises elements with their own uncertainties. This makes errors in elements of information origination process "core IS errors". It is these core IS errors, which lead to decision errors, which in turn give rise to business errors."

   i) Briefly describe any two of the following elements of the information origination process.

      1) Observation of environmental anomaly,

      2) Verification of the problem area data observed,

      3) Problem recognition or operable goal setting,

      4) Prediction of consequences of non-critical environmental factors,

   ii) What are the uncertainties faced by the elements described by you in Question 9(a)? What are their integrity implications?

[8]

Q10) a) i) Briefly describe any two of the following existing integrity mechanisms.

1) Process centered quality approach,

2) Noise reduction based technology under communication theory,

3) Savage (Subjective) Expected Utility (SEU) Theory under decision-making.

ii) What is their main limitation? Explain.

[8]

b) "Facts alone carry no normative or evaluative significance. Knowing the 2006 college budget is of little significance to an elected official not concerned with the objective of governmental efficiency (what was obtained for such as expenditure), the objective of reducing fees, or some set of educational objectives."

What is "Usefulness-Usability-Integrity paradigm"? What is its main implication? [8]

Q11) a) i) Define attributes of Information Integrity. [9]

ii) Equation (1) gives Cost benefit Analysis Equation of information Integrity.

$$\Delta IU(I)|_{Si} = [\{[\alpha(I) \times \beta(I) \times IUUB(I)]|_{Si}\} \times \{A(I)|_{Si}\}] - [COST_{OI}(I)|_{Si} + COST_{ANALY}\{A(I)\}|_{Si} + COST_{OPPORT}\{A(I)\}|_{Si}]$$

..... Equation (1)

What is the significance of this equation for the objective of business competitive advantage? Explain analytically.

b) Figure (10) gives a systems view of a design basis for the "Information Integrity Technology Development System".

Explain the significance of System Dynamics modeling for Integrity Information System development. [9]
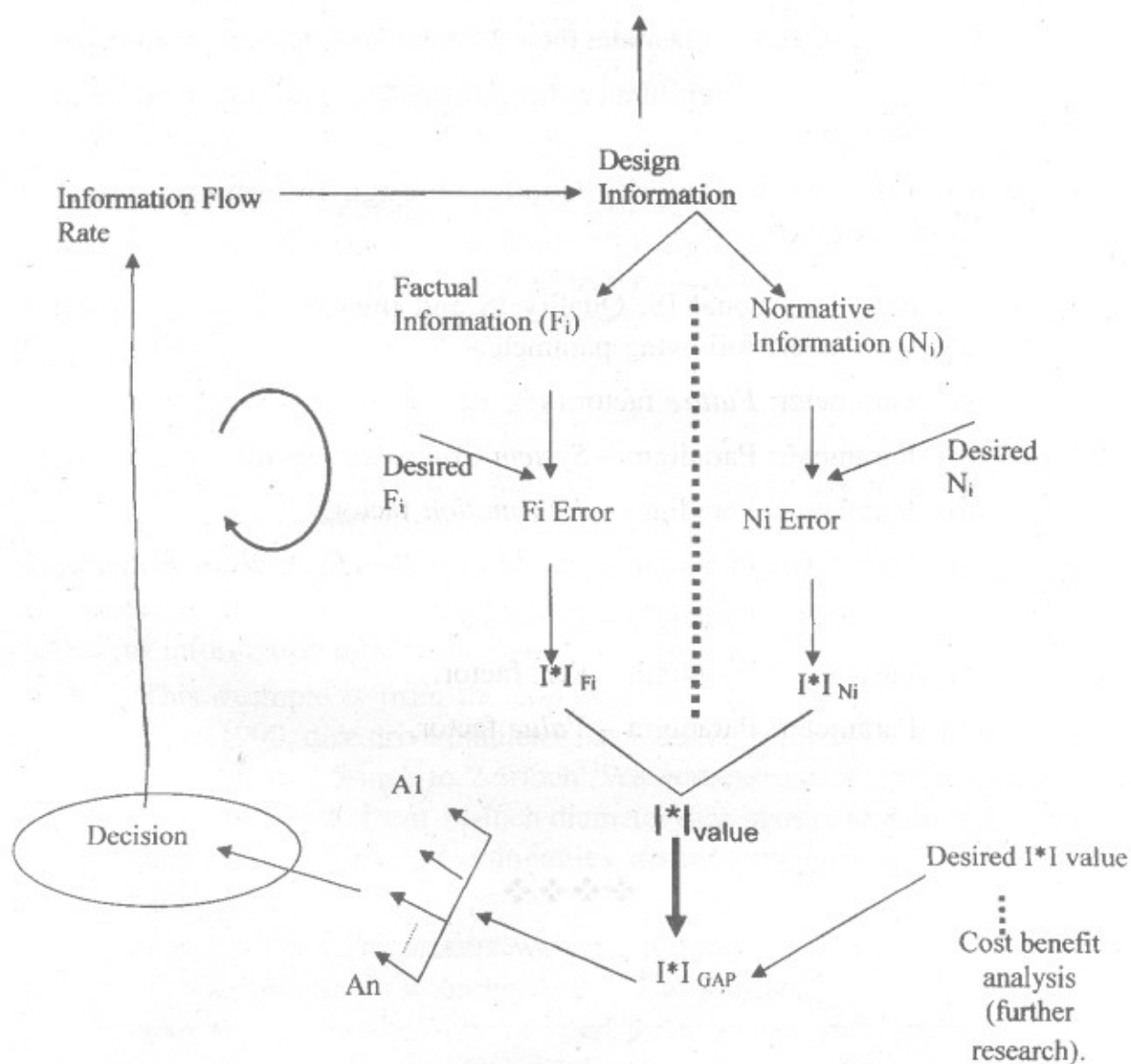
Design
Information

Information Flow
Rate

Factual
Information (F_i)

Normative
Information (N_i)

Desired
F_i

Fi Error

Desired
N_i

Ni Error

$I*I_{Fi}$

$I*I_{Ni}$

$I*I_{value}$

A1

Decision

An

$I*I_{GAP}$

Desired I*I value

Cost benefit
analysis
(further
research).

Figure (10): A systems view of a design basis for the "Information Integrity Technology Development System" leading to Integrity Information System

Q12) a) Write short notes on following: [9]

    i)   Acquisition Cycle under the I*I Technology Development System,

    ii)   Utilization Cycle under the Information Integrity Development System,

    iii)   Information Integrity Control through Information Integrity Technology.

    b) Compare Traditional IS, Quality IS and Integrity IS with respect to any three of the following parameters: [9]

    i)   Parameter: *Future* factor,

    ii)   Parameter: Paradigm – *System Complexity* factor,

    iii)   Parameter: Paradigm – *Information* factor,

    iv)   Parameter: Paradigm – Factor *Cost Benefit Analysis Framework*

    v)   Parameter: Paradigm – *Cost* factor,

    vi)   Parameter: Paradigm – *Risk* factor,

    vii)   Parameter: Paradigm – *Value* factor.

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