PRIMER: SYSTEMS ANALYSIS (SA)

Historical Background

1. Right from the evolution stage, human beings have been facing problems arising from operations of systems. At the initial stage, involvement of human beings was limited to their own social systems. With the growth of human civilisation, the types and size of systems has increased and so have the related problems. This brought about the need to systematically scrutinise the systems using scientific tools. Till 1930s there wasn't any known approach to solving complex systemic problems. During World War II some successful systems studies were carried out which had a telling effect on the outcome of war.

2. By mid 1950s, the problems related to very large operating systems were investigated. The systems being complex in nature and scope being quite large, specialists from many disciplines were involved in solving these systemic problems and this problem solving approach was called '**Systems Analysis**'. The name emphasizes the fact that there existed an operating system associated with each problem that was being investigated. The latter half of the last century has seen tremendous growth in both the scope and diversity of 'Systems Analysis' and the growth and scope is getting enlarged in the twenty first century. New tools are being developed by modern systems analysts to address the complex systems problems. Since 1980s the traditional System Analysis is being progressively called '**Systems Thinking**'.

Purpose of Systems Analysis

3. The central purpose of Systems Thinking is to help decision makers to ameliorate the problems and manage the policy issues faced by them. They do it by improving the basis for their judgment by generating information and marshaling evidence bearing on their problems and on possible actions that may be suggested to alleviate the problem. *Thus, a* ***Systems Approach commonly focuses on a problem arising from interactions among elements in society, enterprises, and the environment; considers various responses to this problem; and supplies evidence about the consequences – good, bad, and indifferent – of these responses.***

Definition

4. There is no standard and universal definition of Systems Analysis. For our purpose, the following definition will meet the objective of studying the discipline: -

A systematic approach for helping a decision maker choose a course of action by investigating his full problem, searching out objectives and

alternatives, and comparing them in the light of their consequences, using an appropriate framework or yardstick – in so far as possible analytic – to bring expert judgment and intuition to bear on the problem.

Systems Thinking Methodology

5. Three major methodologies of Systems Thinking **as relevant to Armed Forces** can be broadly classified as:-

5.1. Hard Systems Thinking (HST).

5.2. Systems Dynamics.

5.3. Soft Systems Methodology (SSM).

Hard Systems Thinking (HST)

6. A hard systems approach to problem solving requires the analyst to check that there is a large measurement of agreement among the system owners as to what the perceived problem or opportunity is. There will also have to be a large measure of agreement about the overall goal. Such cases therefore, lend themselves to quantification of various aspects related to the problem.

Systems Dynamics

7. Systems dynamics relates to the problems where the participants are unitary and the complexity of the problem is high. System dynamics thus extends to application of systems thinking to more strategic problems. System dynamics employs the science of feedback, harnessed to the power of the modern digital computer, to unlock the secrets of complex, multiple-loop non-linear systems.

Soft Systems Methodology (SSM)

8. Soft Systems are perceived as those concerned with human activity of some kind. In soft systems a situation is perceived to exhibit crisis, conflict, uncertainty or unease in relationships among the human ‘actors’.

Reading Material

Dennis Sherwood: Seeing the forest for the trees.

Peter Senge: The fifth discipline.

Alan Waring: Practical Systems Thinking.

Michael C Jackson: Systems Thinking Creative Holism for Managers.

www.systemsthinking.org