SAMUEL NEAMAN INSTITUTE
FOR NATIONAL POLICY RESEARCH

Engineering, Society and Environment: Interactions and Relations

Baruch Karp, Avigdor Zonnenshain, Arnon Bentur

ABSTRACT

The welfare and development of the human society is greatly dependent on engineering developments and innovations. In the modern era this influence has greatly increased in its intensity and scope, as observed by direct influences of engineering developments and artifacts, but also by indirect outcomes which are witnessed as secondary accompanying effects. Indirect effects in modern society may include detrimental influences such as environmental impacts and societal ones, e.g. increase in gaps in society which affects the overall wellbeing and integrity of society.

To enable engineers to consider such accompanying effects, either positive or negative, they should be acquired with the knowledge and awareness of the range of influences of their products. For that to happen a system approach must be implemented, which considers influences of their products on society and environment. To accomplish this holistic approach engineers must have the ability to interact with other disciplines and experts, outside the more focused areas of engineering, such as ecology and social sciences, and to adopt a view of the society as a system into which their artifacts are to be introduced.

The current report provides a holistic view of these aspects. It does not present new insights or facts but rather groups them in a systematic mode to enable engineers to grasp the system approach required from them to understand the interactions with societal and environmental issues. It also highlights some tools which are available for these purposes and suggests tools which need to be developed. The holistic treatment is intended to identify positive as well as negative indirect influences which engineers must take into consideration and provide them with tools to take initiatives to advance the interests of modern society.

To meet these objectives the report covers the following topics:

- Overview of engineering (history, engineering as a societal resource, the art of engineering, science & engineering, engineering education)
- Overview of society (characteristics of society, societal resilience, values and ethics, economy and society, societal changes)
- Engineering modes of activities (engineering resources, societal decision embedded in engineering actions, engineers in-between free economy and society, societal responsibility, ethics and professional responsibility)
- Interactions between engineering-society-environment (industrial revolutions, sustainable development, life cycle assessments: environmental-societal-economic, design for sustainability, design for the human user, safety & security, impact & corporate responsibility)