

Optimal Design of Energy Systems

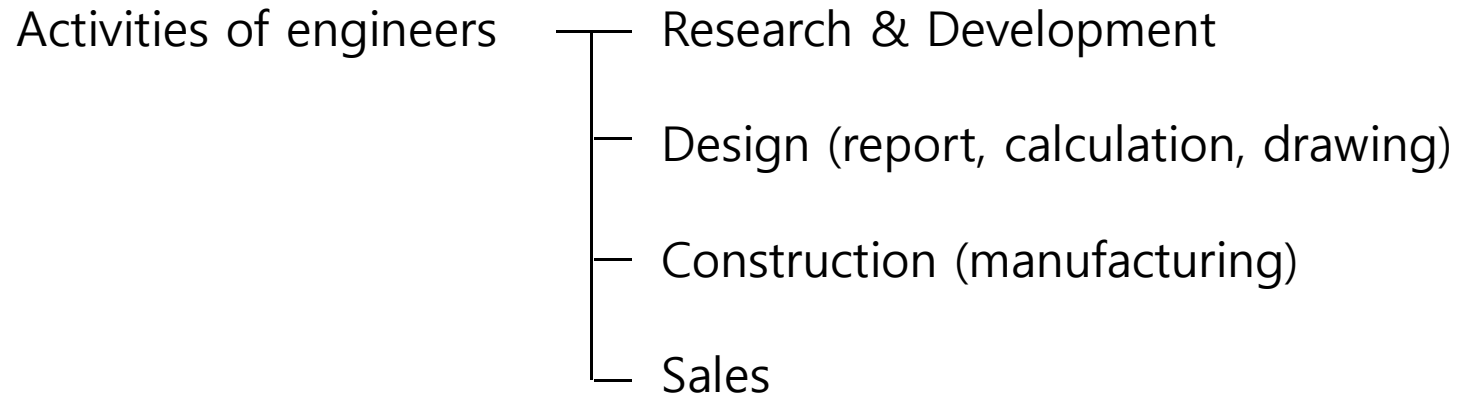
Chapter 1

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1.1 Introduction



Thermal system : heat and work



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1.2 Decision in an Engineering Undertaking

└ whether to continue the project or to drop it

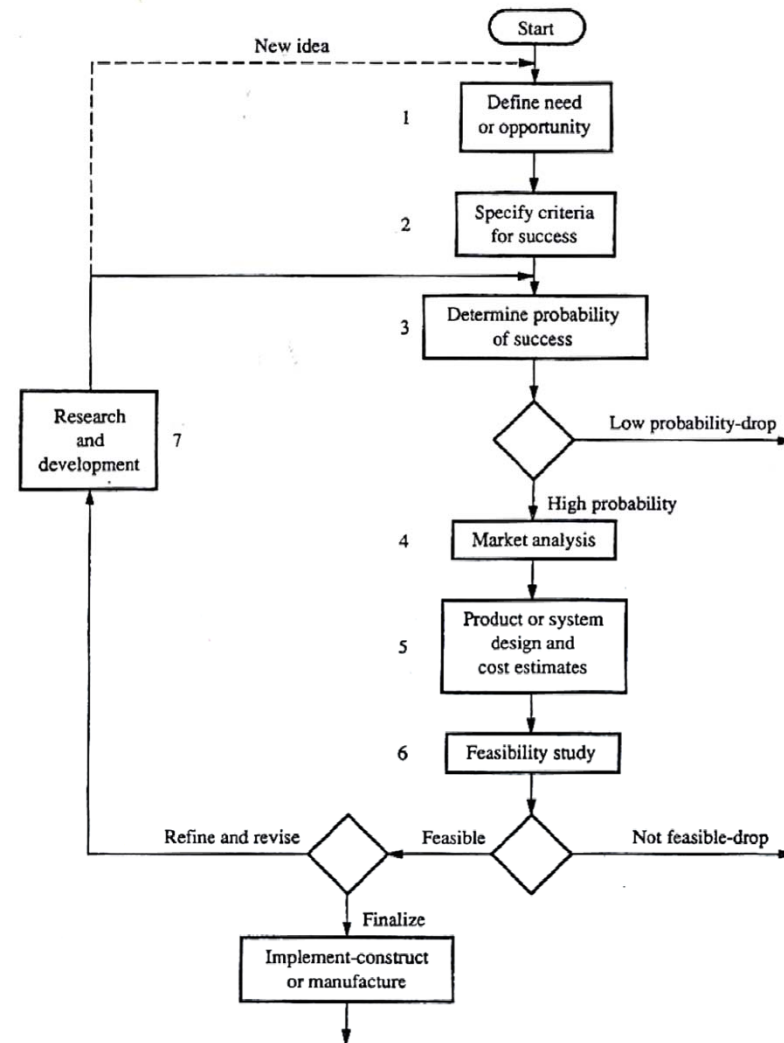


FIGURE 1-1
Possible flow diagram in evaluating and planning an engineering undertaking.

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1.3 Need or opportunity (step 1)

- Renovation or expansion of facilities
- Product that is not manufactured but has market potential
- Research and development

1.4 Criteria of success (step 2)

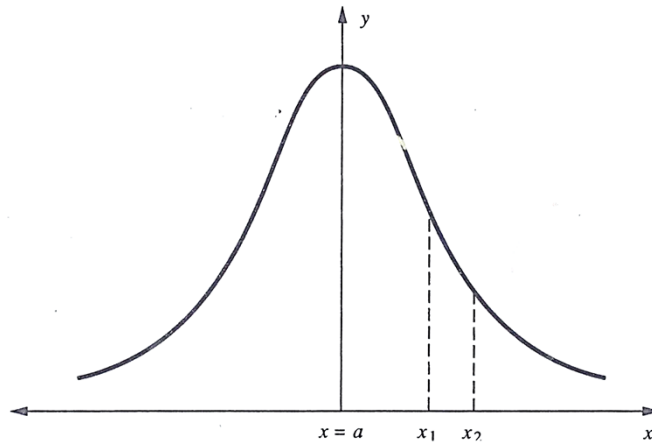
Profit (return on the investment)



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1.5 Probability of success (step 3)

- Prediction of future behavior
- Normal distribution curve



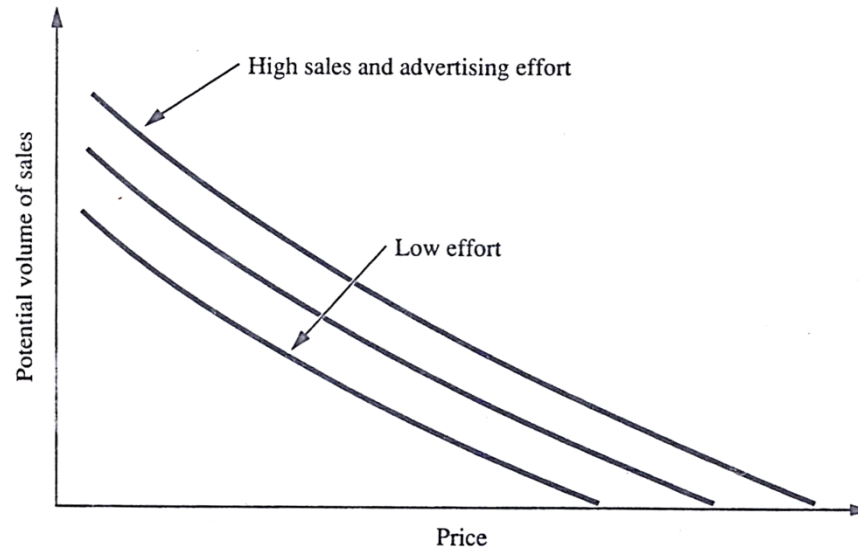
$$y = \frac{h}{\sqrt{\pi}} e^{-h^2(x-a)^2}$$



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1.6 Market Analysis (step 4)

- Indication of favorable reaction by potential customers



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1.7 Product or system design / cost estimates (step 5)

- Study and analysis of individual processes or components
- Act of selecting a single member or part (ex> size of tube in a HX)
- Selecting a larger component (ex> entire shell-and-tube HX)



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1.8 Feasibility Study (step 6)

- Investment capital
- Land
- Labor
- Regulation – codes and standards



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1.9 Research and Development (step 7)

- Important input to the decision process
- Research : provide origin or improvement
- Development : supply working models or a pilot plant



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1.10 Optimization of operation

- After beginning of manufacture of a product 
 - Design
 - Production
 - Marketing

→ optimize the operation of a given facility cost ↓

© Decision : go-or-no-go

