Al- Mustaqbal University College
Chem. Eng. Petr. Ind. Dept.
4th stage

Industrial Management and Ethics

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Lecture 3

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Industrial organization

Distribution and Marketing Costs

These types of general expenses are incurred in the process of selling and distributing the various products. From a practical viewpoint, no manufacturing operation can be considered a success until the products have been sold or put to some profitable use. Included in this category are salaries, wages, supplies, and other expenses for sales offices, salaries, commissions, and traveling expenses for sales representatives, shipping expenses, cost of containers, advertising expenses, and
technical sales service.

Distribution and marketing costs vary widely for different types of plants depending on the particular material being produced, other products sold by the company, plant location, and company policies. These costs for most chemical plants are in the range of 2 to 20 percent of the total product cost. The higher figure usually applies to a new product or to one sold in small quantities to a large number of customers. The lower figure applies to large-volume products, such as bulk chemicals.

PLANT LAYOUT

After the process flow diagrams are completed and before detailed piping, structural, and electrical design can begin, the layout of process units in a plant and the equipment within these process units must be planned. This layout can play an important part in determining construction and manufacturing costs and thus must be planned carefully, with attention being given to future problems that may arise. Since each plant differs in many ways and no two plant sites are exactly alike, there is no one ideal plant layout. However, proper layout in each case will include arrangement of processing areas, storage areas, and handling areas in efficient coordination and with regard to such factors as

1. New site development or addition to previously developed site
2. Type and quantity of products to be produced

3. Type of process and product control
4. Operational convenience and accessibility
5. Economic distribution of utilities and services
6. Type of buildings required and building code requirements
7. Health and safety considerations
8. Waste disposal requirements
9. Auxiliary equipment
10. Space available and space required
11. Roads and railroads
12. Possible future expansion

Preparation of the Layout

Scale drawings complete with elevation indications can be used for determining the best location for equipment and facilities. Elementary layouts are developed first. These show the fundamental relationships between storage space and operating equipment. The next step requires consideration of the safe operational sequence and gives a primary layout based on the flow of materials, unit operations, storage, and future expansion. By analyzing all the factors that are involved in plant layout, a detailed recommendation can be presented, and drawings and elevations, including isometric drawings of the piping systems, can be prepared, with appropriate software. Errors in a plant layout are easily located when three-dimensional models prepared with today's software are used, since the operations and construction engineers can immediately see errors which might have escaped notice on two-dimensional templates or blueprints. In addition to increasing the efficiency of a plant layout, these three-dimensional models are very useful during plant construction and for instruction and orientation purposes after the plant is completed.

CASH FLOW FOR INDUSTRIAL OPERATIONS

Figure-1 below shows a simplified representation of the flow of funds for an overall industrial operation based on a corporate treasury serving as a reservoir and source of capital. Inputs to the capital reservoir normally are in the form of loans, stock issues, bond sales, and other capital sources, and the cash flow from project operations. Outputs from the capital reservoir are in the form of capital investments in projects, dividends to stockholders, repayment of debts, and other investments.

The figure illustrates capital inputs and outputs for an industrial operation using a tree growth analogy, depicting as the trunk the total capital investment, excluding land cost, necessary to initiate the particular operation. The total capital investment comprises the fixed-capital investment in the plant and equipment, including the necessary investment for auxiliaries, and nonmanufacturing facilities, plus the working capital investment.

Cash flows into the operations box as dollars of income sj from all sales while annual costs for operation, such as for raw materials and labor, but not including depreciation, are shown as outflow costs c_{0j}. These cash flows for income and operating expenses can be considered as continuous and represent rates of flow at a given time using the same time basis, such as dollars per day or dollars per year; the subscript j indicates the jth time period.

The difference between the income and operating costs sj — c0j is the gross profit before depreciation charge and is represented by the vertical line rising out of the operations box.

Depreciation is subtracted as a cost before income tax charges are calculated and paid, and net profits are reported to the stockholders. Consequently, removal of depreciation as a charge against profits is shown at the top of Fig. The depreciation charge dj is added to the net profit to make up the total cash flow for return to the capital reservoir. The remainder after income taxes are paid (sj — coj — dj) (1—Φ) is the net profit after taxes that is returned to the capital reservoir. When the depreciation charge dj is added to the net profit, the total project generated cash flow returned to the capital reservoir on an annual basis is

$$A_j = (s_j - c_{oj})(1 - \Phi) + d_j\Phi$$

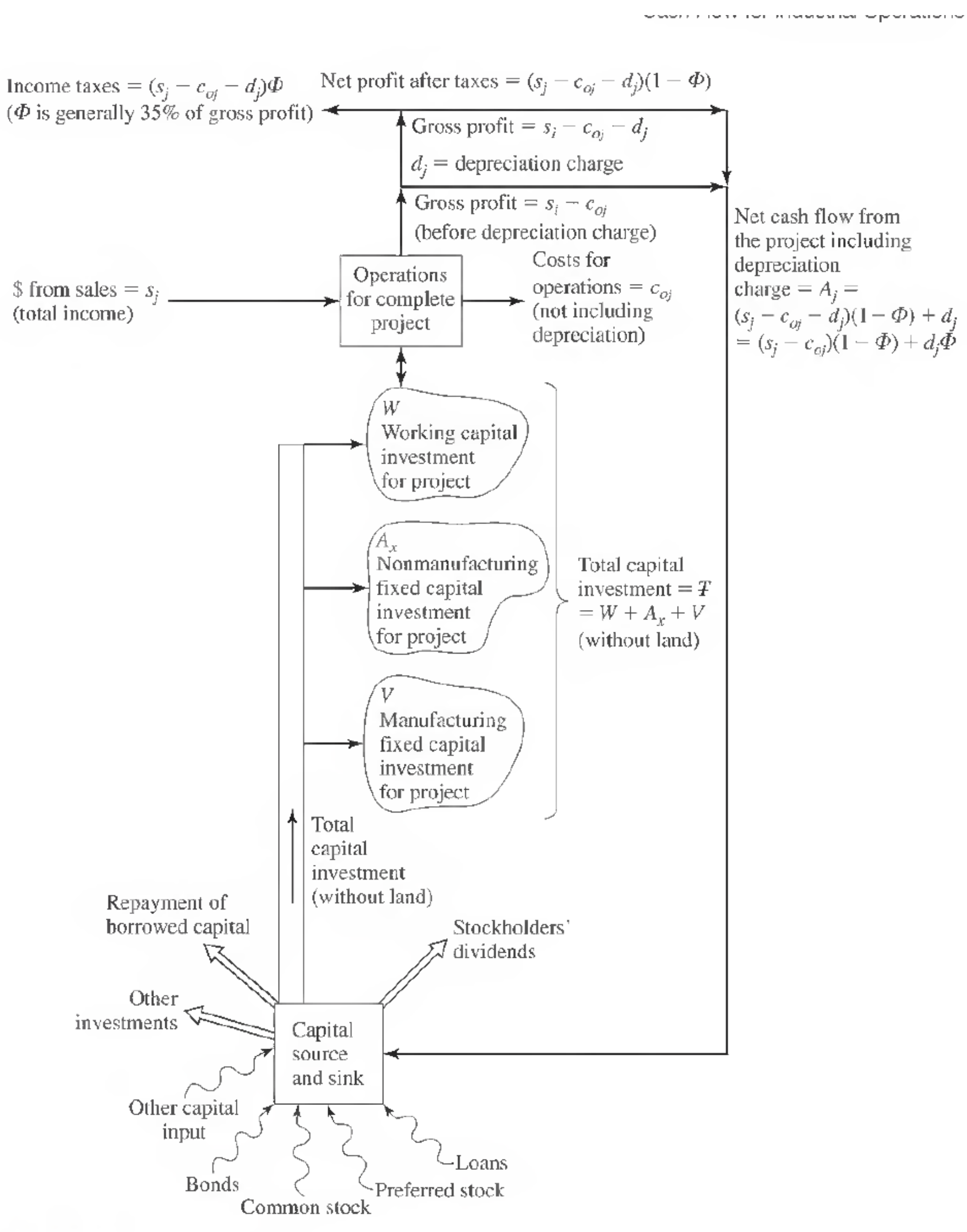

Figure 1
Tree diagram showing cash flow for industrial operations

Cumulative Cash Position

Figure 2 is for the same type of cash flow for an industrial operation except that it depicts the situation as the cumulative cash position over the life cycle of a project. The numerical values are only for illustration.

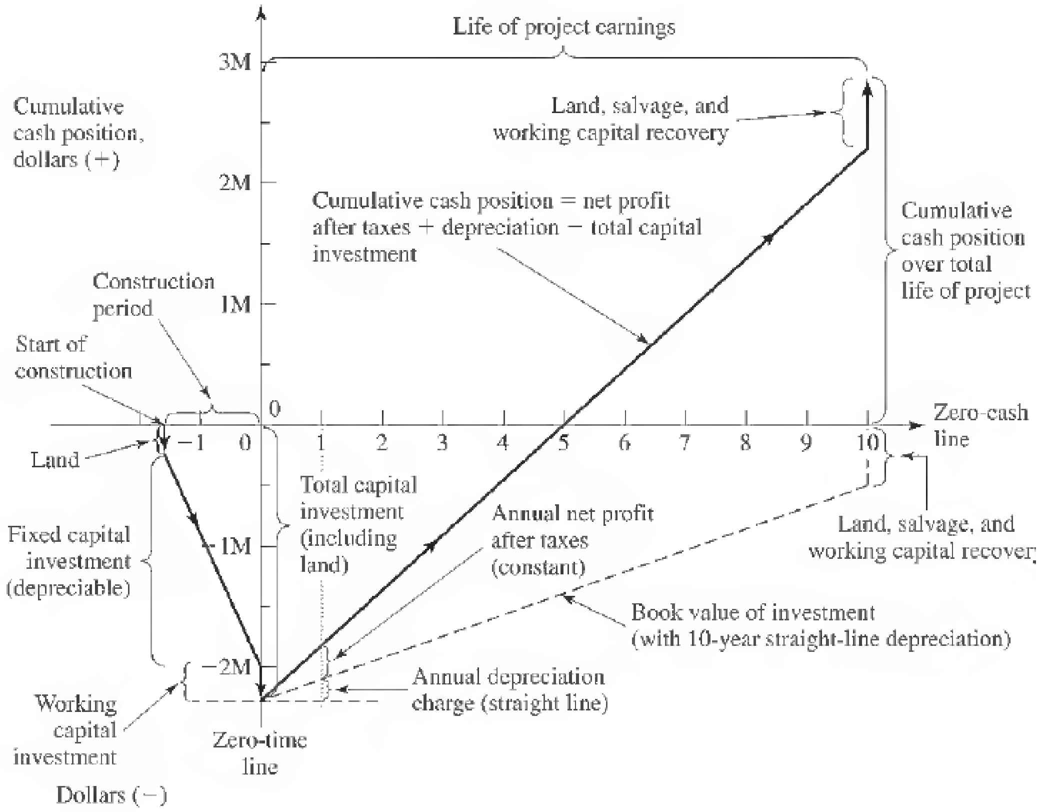

Figure 2
Graph of cumulative cash position showing effects of cash flow over the full life cycle for an industrial operation, neglecting the time value of money