

Product Development Economics

Teaching materials to accompany:

Product Design and Development
Chapter 13

Karl T. Ulrich and Steven D. Eppinger
2nd Edition, Irwin McGraw-Hill, 2000.

Product Design and Development

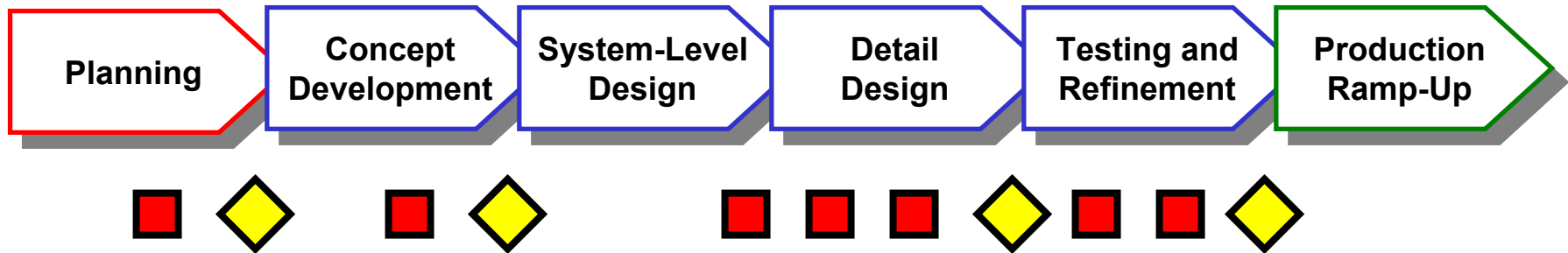
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Product Development Process



◆ Go/No-Go Decision Gates

■ Sensitivity and Trade-off Analysis

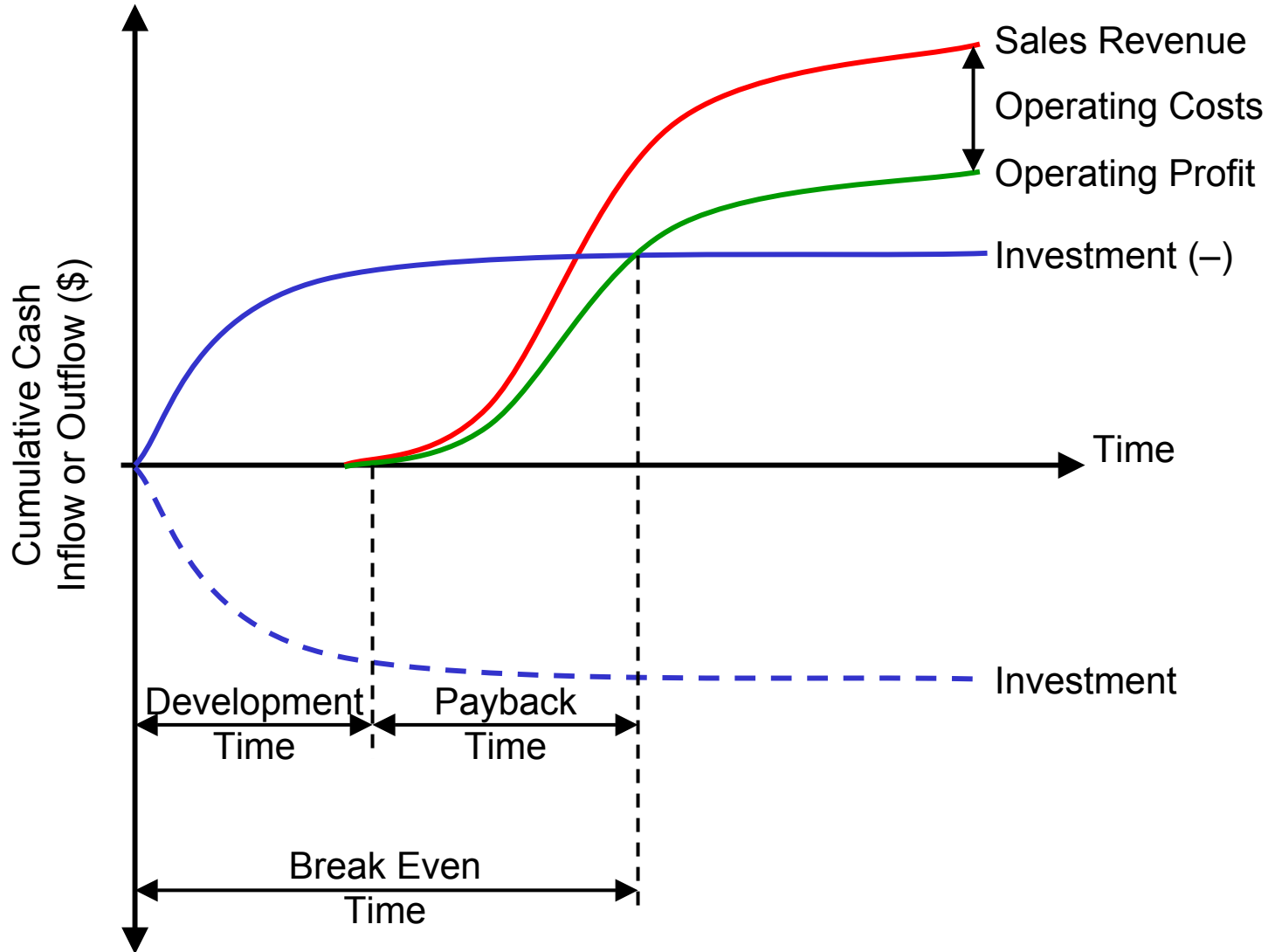
Product Development Economics Example: Polaroid Color Photo Printer



Used with Permission

This item is no longer manufactured by the Polaroid Corporation

Product Development Cash Flow



Project Financial Analysis

(also Business Case Analysis or Product Economics)

- Most common method is NPV analysis of project cash flows.
- Base case model computes nominal NPV.
- Sensitivity and trade-off analysis supports development decisions.
- Qualitative factors also influence decisions.

Net Present Value

$$\text{NPV} = \sum_{\text{periods}} \frac{\text{period cash flow}}{(1 + \text{discount rate})^{\text{period}}}$$

$$\text{NPV} = \sum_{i=1}^N \frac{C_i}{(1+r)^i}$$

Inputs for NPV Base Case

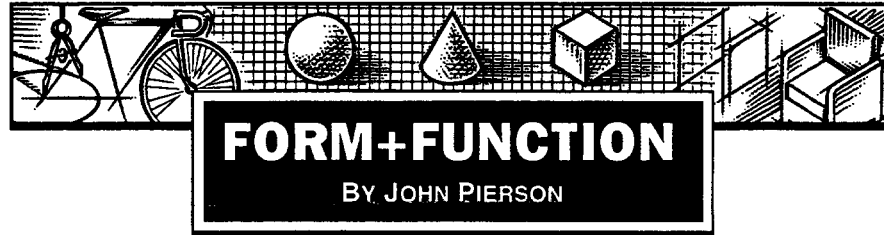
- Development cost and timing
- Testing cost and timing
- Tooling investment and timing
- Ramp-up cost and timing
- Marketing and support cost and timing
- Sales volume and lifetime
- Unit production cost
- Unit revenue
- Discount rate

Example: Stanley Hammer



- Designed in 1995 by Product Genesis for Stanley Tools
- Contractor Grade™
- Graphite composite shaft
- Soft rubber grip

WSJ April 14, 1995

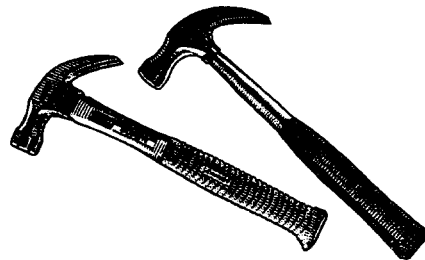


Getting a Handle On Hammer Markets

HAMMER MAKERS are trying to get a better grip on their market.

Plumb Tool's invention of the fiberglass handle in 1954 and Estwing's solid steel hammer in 1926 were revolutionary. Now Stanley Tools, a subsidiary of The Stanley Works, is offering an evolutionary grip.

Designed with Product Genesis, Cambridge, Mass., Stanley's new Contractor



Left, Stanley's new hammer with its softer grip. Right, an older model.

Grade hammers have grips of softer, light-grey vinyl. Concentric, wavy grooves

are meant to provide better traction and a place for sweat to run off. The traditional elliptical handle has given way to a rounder shape — thinner toward the end, thicker in the middle. The grip's end is more flared to keep the hammer from flying out of the hand.

All hammers represent a compromise between strength and comfort. Estwing's solid steel model almost never breaks but creates a lot of vibration. So the company covers its steel handle with a blue nylon/vinyl grip that absorbs the shock.

In the early 1980s, Hart Tool of Huntington Beach, Calif., mated a curved hickory hatchet handle to a steel hammer head to produce its California Special, which has a strong following among West Coast house framers. "Wood absorbs shock better but is the weakest," says John Reid, a Hart principal.

Not all pros like the new Stanley grip. "My hand is big, but the new Stanley overfills it and threatens to break my grip," says Bill Greene, an East Bridgewater, Mass., carpenter and cabinet maker.

But Dennis Pitts, an installer for Midland Seamless Gutters, Warwick, R.I., prefers his new Stanley hammer over his old Stanley. "It doesn't slip," he says.

Inputs for Hammer Base Case

- Development cost and timing
\$120k, 9 months
- Testing cost and timing
\$100k, 1 year
- Tooling investment and timing
\$200k, 6 months
- Ramp-up cost and timing
\$50k, 3 months
- Marketing and support cost and timing
\$250k + \$80k/year for 2 years
- Sales volume and lifetime
200k units/year, 5 years (actually not flat)
- Unit production cost
\$4/unit + \$2/unit overhead
- Unit revenue
\$12/unit wholesale
- Discount rate
10%/year

Excel
Spreadsheet
Model