

Analysis & Probability/Algebra: R&D Program Manager

Hewlett-Packard Company

Job Description: Develop full business models for development programs and work with all functional areas (R&D, marketing, finance, manufacturing, etc.) to bring new products to market.

Problem:

A new technology computer storage tape format has been designed by a computer company. Other companies "license" the right to produce products that use this format. They pay an initial fee of \$10,000 and then pay \$10 for every tape cartridge sold.

The original company has expenses to develop, document and test this new tape format. It wants to know if the new tape license format will make money for the company.

Given the following information . . .

- Original company expenses: \$1,000,000 to develop format. 1st year expenses to set up documents and tests - \$200,000. Each year after 1st - \$50,000 / year to maintain.
- Assume 5 companies license the format: 2 during the 1st year and 3 more during the 2nd year.
- Assume each new company will sell 5,000 tape cartridges the 1st year and 10,000 tape cartridges every year after the 1st.

Questions:

1. How many years before the original development company begins to earn money on its \$1,000,000 R&D investment?
2. How much money does the original company make per year in the year three after the "market is mature?"
3. Do you think this investment was a good investment?
4. Which would affect the decision most?
 - a. what if initial license fee was \$5,000 instead of \$10,000?
 - b. what if more than 5 companies entered the market?
 - c. what if a new format "captured the market" in 4 years?

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Solution: (See problem for details.)

1. During which year will the original development earn money, disregarding the \$1,000,000 R&D investment? Use a chart to organize income vs expenses:

	Before Year 1	Year 1	Year 2	Year 3	Year 4
Expenses	\$-1,000,000	\$ -200,000	\$ -50,000	\$ -50,000	\$ -50,000
License Fees		\$20,000 (2·\$10,000)	\$30,000 (3·\$10,000)	- 0 -	- 0 -
Income Per Tape Fees		\$100,000 (2·10·5,000)	\$200,000 (2·10·10,000) \$150,000 (3·10·5,000)	\$500,000 (5·10·10,000)	\$500,000 (5·10·10,000)
Yearly Income		\$120,000	\$380,000	\$500,000	\$500,000
Yearly Gain/Loss		\$-80,000	\$330,000	\$450,000	\$450,000

Answer: During Year 2, the company begins to earn more than it spends.

Yearly Income - Yearly Expense = Yearly Gain or Loss (Earnings)
 (\$380,000 - \$50,000 = \$250,000)

2. After "market is mature" no new companies buying a license, and all companies are at final volume.

[(# of license companies) x (tape cartridges per year) x (\$ fee/cartridge)] - expenses by original company

$$[(5) \times (\$10,000) \times (\$10)] - \$50,000 = \$450,000$$

3. Was this a good investment?

Yes. By the end of Year 4, the original company has regained its investment plus \$150,000 and adds another \$450,000 per year.

4. Effects of "variation" - sensitivity analysis.

a. License only \$5,000 → only drops by \$25,000 / minor change

b. More than 5 license companies → adds \$100,000/year at "maturity" / major change

c. New format "captures market" in 4 years → might make investment a bad decision / difficult change