

# การวิเคราะห์ความเป็นไปได้ และโอกาส ทางการตลาด เพื่อการวิจัยเชิงพาณิชย์

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# การวิเคราะห์ความเป็นไปได้ (Feasibility Study)

- Market feasibility study
  - Description of industry
  - Current market or anticipated future market potential
  - Market size (sales), market geography, purchasing power, competition
  - Market acceptance/Market barrier/Market penetration
- Technology feasibility study (how you will deliver a product or service)
  - Materials, labor, transportation, business location or technology needed
  - Regulations i.e. Use of GMOs
  - Technology Due diligence
    - Ethical review (animal and human trials)
    - Freedom to operate (IP due diligence)
  - Manufacturing capability (scale up, cost-effectiveness)

# Feasibility Study

- Cost-Benefit Analysis
  - Cost comes from resources used i.e. machine, consumable materials, labor, etc.
    - Fixed costs
    - Variable costs
  - Benefits
    - Financial (in-come/revenue)
      - Future income approach (Net Present Value)
      - Income: Cost of good (or service) sales (Unit price x Amount), Market share,
      - Saved cost
      - Licensing fee
    - Non-financial (i.e. social or public benefits)
      - Who are the key stakeholders

# การประเมินประโยชน์ทางสังคม

ผู้เกี่ยวข้องที่สำคัญ	ผลกระทบ ในทางบวก สูง (+3)	บวกกลาง (+2)	บวกต่ำ (+1)	ลบต่ำ (- 1)	ลบกลาง (-2)	ผลกระทบ ในทางลบ สูง (-3)	รวม คะแนน
ชาวบ้าน		ได้รับ .....					+2
พ่อค้า				ได้รับ .....			-1
เกษตรกร	ได้รับ .....						+3
<b>รวม</b>							<b>+4</b>

ที่มา: รศ.ดร.พสุ เดชะรินทร์ คณะพาณิชยศาสตร์และการบัญชี จุฬาลงกรณ์มหาวิทยาลัย เอกสารประกอบการประชุมเชิงปฏิบัติการเพื่อ  
เพิ่มขีดสมรรถนะด้านการบริหารจัดการแก่ผู้บริหารระดับสูง 8 – 10 กรกฎาคม พ.ศ. 2548

# Feasibility Study Tools: Opportunity Canvas

ปัญหา / สิ่งที่ต้องการแก้ไข (ระบุ Need, Want)		ผลิตภัณฑ์ / บริการ	
คุณค่า		คุณค่านั้นสำหรับใคร / Way of life	
สิ่งที่ต้องทำ (เรียงตามลำดับก่อนหลัง) What / When / Where / Why / How		วิธีวัดผลความสำเร็จแต่ละขั้นตอน ( Milestone )	
สิ่งที่ทำได้เอง	สิ่งที่ต้องพัฒนา และเรียนรู้	สิ่งที่ทำไม่ได้ ต้องการใครช่วย	
ค่าใช้จ่าย (สอดคล้องกับสิ่งที่ต้องทำ)		รายได้	

# How to Write Feasibility Study Conclusion?

- Feasibility study is just a study
- Your conclusions need to be based on research, verifiable information (not a simple belief that your idea can work)
- Discuss how commercialization can succeed
- If your commercialization idea takes a non-traditional approach to something, explain why this approach will help you succeed

# Results of Feasibility Study

- Feasible (but the following needs to be addressed first)
  - Concerned risk factors
  - Areas that need more thinking through
  - New option that can improve the project
- Not feasible (too many obstacles or high risks)
  - Sometimes the conclusion comes very early in the process
    - Save time and money

การวิเคราะห์ต้นทุน และการประเมินเทคโนโลยี  
(Technology Evaluation)  
เพื่อการวิจัยเชิงพาณิชย์



# การวิเคราะห์ต้นทุนผลงานวิจัย/นวัตกรรม สำหรับการวิจัยเชิงพาณิชย์

- ต้นทุนการทำวิจัย/สร้างนวัตกรรม
  - ค่าใช้จ่ายในการทำวิจัยและพัฒนา (ค่าวัสดุ ค่าจ้างค่าตอบแทน ค่าบริหารจัดการ ฯลฯ)
- ค่าใช้จ่ายในการคุ้มครองทรัพย์สินทางปัญญา
- ค่าใช้จ่ายในการดำเนินการเพื่อพิสูจน์เทคโนโลยี (**proof of technology cost**)
  - การทำผลิตภัณฑ์ต้นแบบ
- ค่าใช้จ่ายในการพิสูจน์คุณค่า (**proof of value cost**)
  - การทดสอบตลาด (**market testing**)

# การวิเคราะห์ต้นทุนผลงานวิจัย/นวัตกรรม สำหรับการวิจัยเชิงพาณิชย์

- ต้นทุนการทำวิจัย/สร้างนวัตกรรม
  - ค่าใช้จ่ายในการทำวิจัยและพัฒนา
    - ค่าวัสดุ (ใช้ทั้งหมดหรือบางส่วน)
    - ค่าจ้างค่าตอบแทน ค่าบริหารจัดการ) ใช้ค่าใช้จ่ายที่แท้จริงหรือไม่ และ/หรือ เป็นค่าใช้จ่ายที่สมเหตุสมผลหรือยัง
    - ค่าใช้จ่ายที่มักจะไม่ได้นำมาคิด: ค่าสาธารณูปโภค ค่าอุปกรณ์เครื่องมือที่ใช้ในการวิจัยและพัฒนาที่จำเป็นซึ่งมีอยู่แล้ว
      - อาจคิดในรูปแบบของค่าเช่า หรือร้อยละของเวลา หรือ มูลค่าที่นำมาใช้งานในโครงการวิจัย

# ค่าใช้จ่ายในการคุ้มครองทรัพย์สินทางปัญญา

- ขึ้นอยู่กับประเภทของทรัพย์สินทางปัญญา
  - ลิขสิทธิ์ ความลับทางการค้า **VS** สิทธิบัตรการประดิษฐ์ และการออกแบบ
- ประเทศที่ต้องการยื่นขอรับความคุ้มครอง
- การดำเนินการในการคุ้มครอง
  - In-house (Technology Licensing Office, TLO)
  - Out-source (IP Law-firm)
  - Mixed (National/International)
  - Filing Strategy (National the PCT or Straight to PCT)

# Technology Evaluation

- What is the problem being solved?
- How is problem currently being solved?
- Similar technologies available?
  - Already Patented?
- Identify drivers for adoption of new technology
  - What are the advantages of New invention?
  - Faster, cheaper, easier?
- Stage of technology
  - Early stage
  - Ready technology

# Technology Evaluation

- Invention may be patentable, but not licensable
  - Professor invented a new way to package mangoes
    - Results in 15% longer shelf life & less bruising
    - Mango suppliers can save several millions/yr
  - But invention does not work with existing packaging machinery
    - Would need to spend >500 million on factory conversion
  - Consider Cost/Benefit Analysis

# Technology Evaluation

- How much development is needed?
  - Is there a prototype?
    - Cost for development?
    - Timeline?
    - Easy to design around?
  - Is the Technology:
    - An incremental improvement or a new innovation?
    - Is market ready for the invention?
    - Is the technology ready for the market?
    - Is it a “disruptive” technology?

# Market Evaluation

- Potential barriers to adoption
  - High development costs
  - New manufacturing facilities needed
  - Market is very mature-full of competitors
  - Rare/expensive materials needed
  - Technology is too early or too late
  - Regulatory hurdles

# Who is the Potential Consumer?

- Determine demographic of customer base
  - Who will use invention?
  - Can they afford it?



# Market Evaluation

- Most technologies are improvements or incremental advances
- Prevailing technology vs. Disruptive technology
- Identify market size & opportunity
  - Annual sales, unit sold/yr.
  - Maturity of market

# Market Evaluation

- Are cost/prices high?
- How many have been sold?
- Have prices fallen recently?
- How many competitors?
- How often are improvement made?

# Market Research Tools

- Commercial market reports: Hoovers, Market watch, Frost & Sullivan, etc.
- Ask inventors about market
- Web search
- Trade journals, conference
- Identify company in technology area
  - Current products, product lines
  - Annual reports of key companies
  - Business sector information

# Business Evaluation

Feasibility	Evaluation
Investment	What investment is required to bring technology to market?
Risk level	What are the risks: Infrastructure development, Manufacturing, consumer adoption?
Market penetration	Is technology in market sweep spot? Are there different filed of use? Can technology be exclusively licensed?
Product life cycle	Can multiple products be created with technology? What is the product life-cycle? Product turnover Planned obsolescence
Regulatory issues	Does product need regulatory approval? FDA, USDA, UL, CE certification?

# Market Research: Marketing Decision Making Framework



Source: Burke Institute

Know the product, know the market, understand the fit

# Marketing Flow Chart



การประเมินมูลค่าเทคโนโลยี (ทรัพย์สินทางปัญญา)

จากงานวิจัยเชิงพาณิชย์

Technology (IP) Valuation  
from Commercialized Research

You can't  
manage what  
you don't  
measure





# Technology Valuation

- Value is what a willing buyer and a willing seller have agreed upon
- Critical point is finding a particular value that is agreeable to both the buyer and the seller
- Valuation is the process of estimating a mutually agreed upon the value for a product (or tangible assets) or intellectual property (or technology)
- Perfect valuation scenario would be one where both the buyer and seller walk away each thinking it got the best deal

# Technology Valuation

- Valuation technique is used everyday
- Cost-Benefit approach (considering the alternative)
- Value will change depending on:
  - Need/want (nice to have or must have)
  - Time
  - Place
  - Buyer or seller
  - Competitor

# Some Valuation Misconceptions

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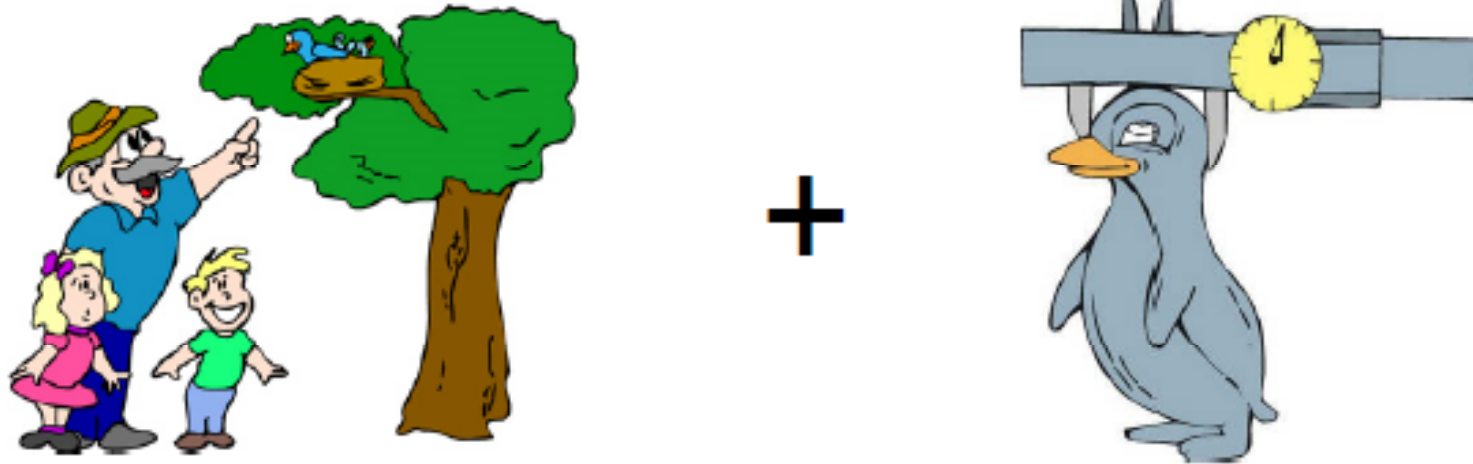
1. Valuation analysis can only be conducted by financial experts.
2. The output from the valuation analysis—the value result—is more important than the valuation process.
3. The more quantitative and mathematical approach, the more accurate the value result.
4. A valuation analysis must generate a precise result to be beneficial.
5. There are magic bullet methods for determining value.



# Identify and measure

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Valuation is fundamentally a 2-step  
“identification” + “measurement” exercise



1. Identify the net benefits; and
2. Determine the value for each benefit

# IP (Technology) Valuation

- Cost approach
  - Not so practical (the cost of developing something is not usually related to the value of any IP it contains)
  - Useful for joint venture of university and industry
- Market approach (benchmarking with comparable technology)
  - Cannot be used with revolutionary new product/service
  - Difficulty in obtaining data

# IP (Technology) Valuation

- Economic approach
  - Discounted cash flow/ Income approach (financial benefit only)
  - Benefits approach (financial and social or public benefits together)
    - Discount rate (Inflation, Cost of capital, Stage of technology)
- Royalty rate approach
  - Give the inventor a return on sales of the final product
  - Often used to share the risk between the inventor and business developer
  - Based on the past for similar technology
  - Arbitrary (little or no relation to the added value of technology or IP)

# Royalty Rate

**TABLE 4: EXAMPLE TABLE OF ROYALTIES DEVELOPED BY EXPERIENCE BY A UNIVERSITY LICENSING OFFICE<sup>11</sup>**

PRODUCT	ROYALTY (%)	COMMENTS
Materials processes	1-4	0.1%-1% for commodities; 0.2%-2% for processes
Medical equipment/devices	3-5	
Software	5-15	
Semiconductors	1-2	Chip design
Pharmaceuticals	8-10	Composition of materials
	12-20	With clinical testing
Diagnostics	4-5	New entity
	2-4	New method/old entity
Biotechnology	0.25-1.5	Process <sup>a</sup> /nonexclusive
	1-2	Process <sup>a</sup> /exclusive

a Expression systems, cell lines, growth media/conditions

TECHNOLOGY/INDUSTRY	EARNED ROYALTY (%)	UPFRONT PAYMENTS (IN US\$)	MINIMUM PAYMENTS (IN US\$)
Reagents/process	1-3	Patent costs	2,000-10,000
Reagents/kits	2-10	Patent costs	2,000-10,000
Diagnostics in vitro	2-6	5,000-20,000	2,000-60,000
Diagnostics in vivo	3-8	5,000-20,000	2,000-60,000
Therapeutics	4-12	20,000-150,000	20,000-150,000
Medical instrumentation	4-10	5,000-150,000	5,000-20,000 (yr. 1) 10,000-25,000 (beyond yr. 1)

Source: [www.iphandbook.org](http://www.iphandbook.org)

# Royalty Rate

**TABLE 6: PROPOSED STANDARD ROYALTIES<sup>15</sup>**

	<b>EXCLUSIVE (%)</b>	<b>NONEXCLUSIVE (%)</b>
Development rDNA <sup>a</sup> drug	7-10	3-4
Approvable rDNA <sup>a</sup> drug	12-15	5-8
Therapeutic mAb <sup>b</sup>	5-7	3-4
Diagnostic mAb <sup>b</sup>	3-4	1-2
Drug delivery component	2-3	0.5-2

a Recombinant DNA

b Monoclonal antibodies



# Rule of Thumb

- Licensor (as a developer of technology) considers as a fair deal to get 25%-33% of the licensee's profit (not income)
- In practice often used as an indicator
- Not quite applicable for early stage technology

# Income Approach (Discounted Cash Flow)?

1. Identify the potential market
2. Determine cash flow (or other benefits)
3. Estimate the expected growth of cash flow over the economic life of the technology or IP
4. Project expected cash flow over the period of the economic life of the technology or IP (taking into account growth rate for each year)
5. Subtract any costs (cash outflows) that are required to generate the income (Net Cash Flow)

# Income Approach (Discounted Cash Flow)?

6. Discount projected future Net Cash Flow for every year under projection
7. Determine Net Present Value (NPV)

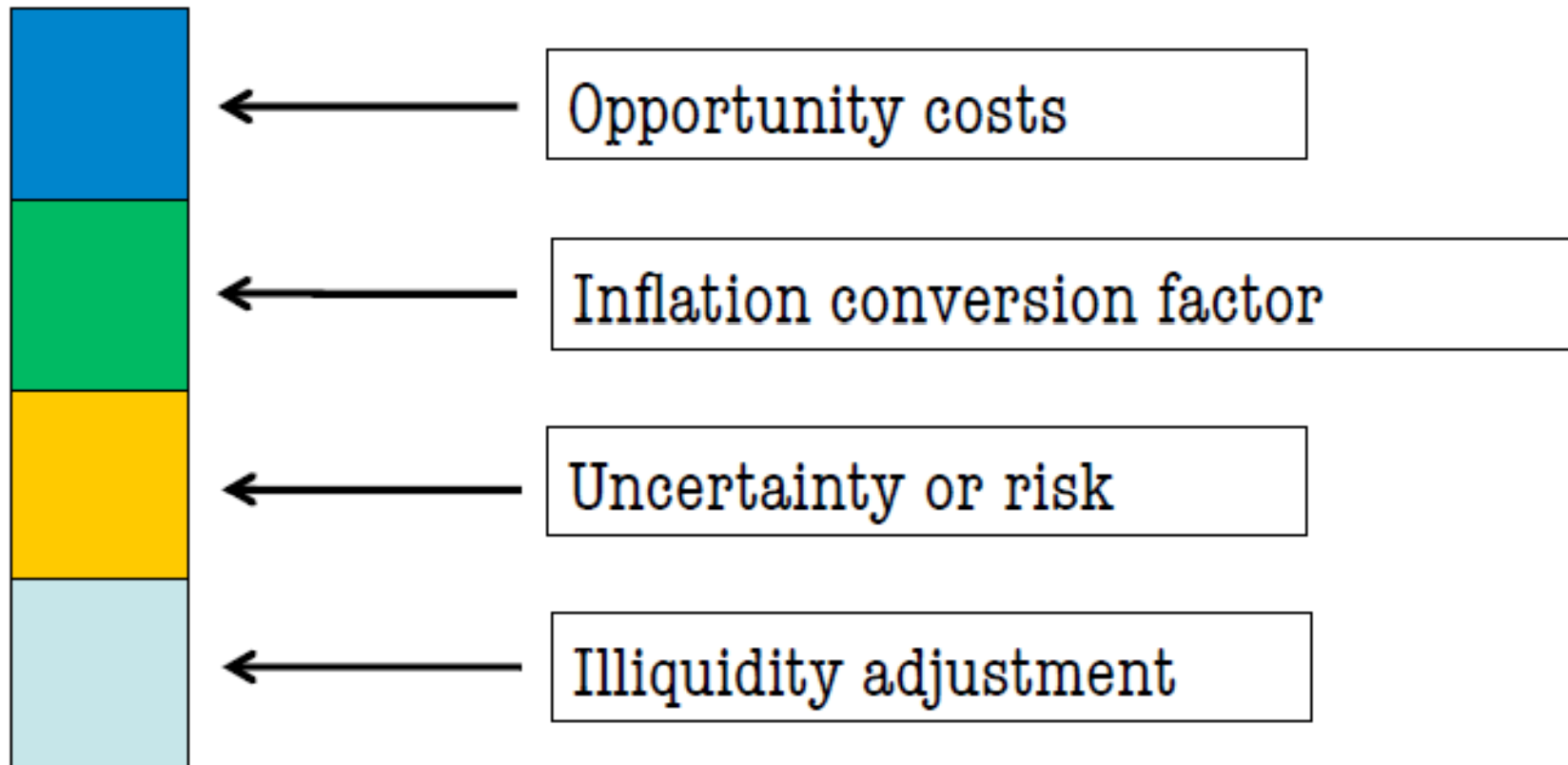
$$PV = \sum_{t=1}^n \frac{CF(t)}{(1+r)^t}$$

# Discount Rate

- Discounting = reducing a projected net cash flow to a Net Present Value (NPV) of the technology or IP
- Discount rate
  - Inflation
  - Real interest rate
  - Risk premium

# Components of the discount rate

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# Early Stage Technology

- Still not commercialized or proven beyond laboratory experiment
  - Untested
  - Unknown whether the market exist for that technology
  - Prototype technology
    - Unique, hand constructed version of the product or process
    - Closer to commercialization
    - Full scale manufacturing has not yet proven

# Early Stage Technology

- Still not offered for commercial sale
- Has not yet passed the industry standards
- No indication about desirability of the technology on the market
- Most important- there is a need for more
  - Money
  - Time

# Discount Rate for Early Stage Technology

- Discount rate reflects risk
- Biotechnology and pharmaceutical industry-early stage technology particularly risky
  - Discovery stage -80%
  - Preclinical -60%
  - Phase I Clinical trials -50%
  - Phase II Clinical trials -40%
  - Phase III Clinical trials -25%
  - New Drug Application -22.5%
  - Product Launch -15-17.5%



<b>Typical VC Discount Rates</b>	
<b>Stage of Development</b>	<b>Discount Rate</b>
Seed Stage	60 to 100+%
Early Stage	40 to 70%
Intermediate Stage	30 to 50%
Later Stage	20 to 35%

*Source:* Based on a table in Gordon V. Smith & Russell L. Parr, *Intellectual Property: Valuation, Exploitation, and Infringement Damages* 292 (Wiley, 2005)

## Developing revenue projections from analytical analysis

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Two common ways to develop revenue forecasts:

1. Market size x market share

- Project anticipated size of market
- Project the percentage of that market the party will capture

2. Units sold x unit price

- Project the number of units the party will sell
- Project the unit price

	<b>Year 1</b>	<b>Year 2</b>	<b>Year 3</b>	<b>Year 4</b>	<b>Year 5</b>
<b>Revenues:</b>					
Units sold	0	1,000	5,000	10,000	50,000
Price per unit	\$0	\$300	\$240	\$180	\$150
Total revenue	\$0	\$300,000	\$1,200,000	\$1,800,000	\$7,500,000
<b>Production costs:</b>					
As % of revenues	0%	75%	65%	35%	35%
Estimated costs	\$0	\$225,000	\$780,000	\$630,000	\$2,625,000
Gross profit	\$0	\$75,000	\$420,000	\$1,170,000	\$4,875,000
<b>Operating costs:</b>					
Selling expenses (at 10% of total revenue)	\$0	\$30,000	\$120,000	\$180,000	\$750,000
R&D expenses (at 6% of total revenue)	\$0	\$18,000	\$72,000	\$108,000	\$450,000
General & administrative expenses (at 9% of total revenue)	\$0	\$27,000	\$108,000	\$162,000	\$675,000
Initial overhead expenses (Initial R&D, regulatory costs, salesperson training, manufacturing engineering)	\$250,000	\$0	\$0	\$0	\$0
<b>Operating profits</b>	<b>(\$250,000)</b>	<b>\$0</b>	<b>\$120,000</b>	<b>\$720,000</b>	<b>\$3,000,000</b>

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ที่มา: เอกสารประกอบการอบรม Licensing Academy 2014, U. of California, Davis

## Operating profits

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- **Revenues** = money earned for selling a good or service
- **Cost of sales (or production costs)** = cost to produce good or service
- **SG&A expenses (or operating costs)** = company's day-to-day operating expenses

**Operating profits** = are calculated by subtracting cost of sales and SG&A expenses from revenues.

<b>Revenues</b>	\$12,000,000
<b>Cost of sales</b>	<u>(\$5,000,000)</u>
<b>Gross profit</b>	\$7,000,000
<b>SG&amp;A expenses</b>	<u>(\$4,000,000)</u>
<b>Operating profits</b>	\$3,000,000

## Operating profits

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- Operating profits are the company's profits before interest expenses, depreciation, income taxes, and other exceptional items (see full income statement at end of this handout).
- Operating profits are frequently used when conducting a valuation analysis, because they capture the core economic task of producing and selling the good or service.
- The expenses that come after operating profits are often unique to the individual company, and tell us less about the value generated by the valued asset.

# Indirect benefits

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1. Provide the technology assets needed for innovation-based economic development
2. Improve social welfare by resolving important local problems
3. Generate knowledge spillovers that benefit the country's business sector
4. Improve the link between academic research and industry, which:
  - Help universities to better prepare the country's skilled workforce
  - Allow local businesses to develop business plans that leverage the concentrated innovation capacity of research institutes and universities
  - Help researchers understand industry's needs when choosing research projects

## Indirect benefits are too frequently forgotten

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**Simple valuation question:** Should the government fund the following R&D project?

1. Project will result in a technology breakthrough that will generate **direct** returns with a present-day value of \$20 million
2. The cost for the project is \$25 million

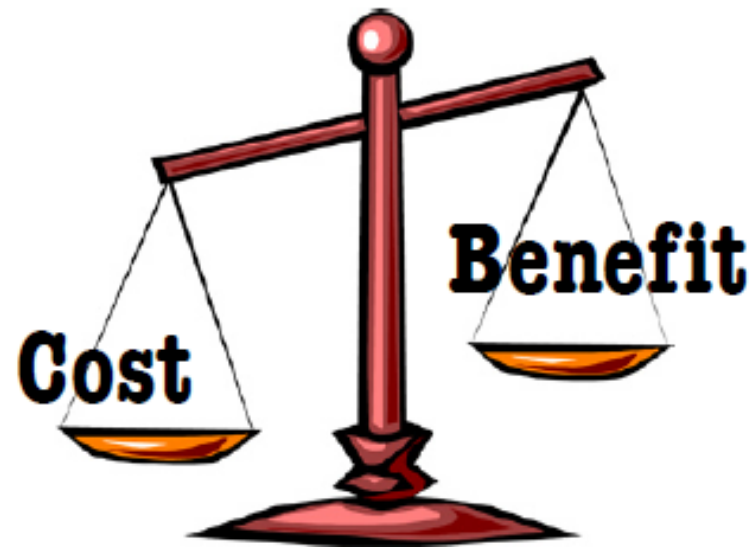
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**Simple valuation question:** Should the government fund the following R&D project?

1. Project will result in a technology breakthrough that will generate **direct** returns with a present-day value of \$20 million
2. The cost for the project is \$25 million

INITIAL ANSWER = NO





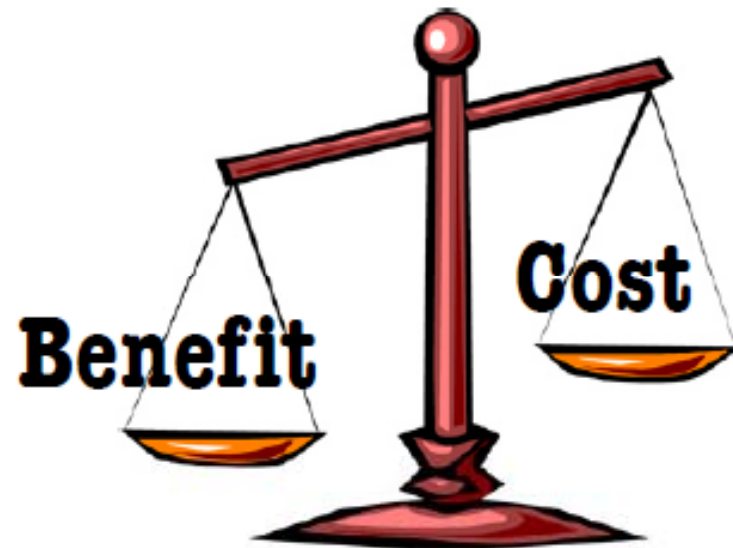
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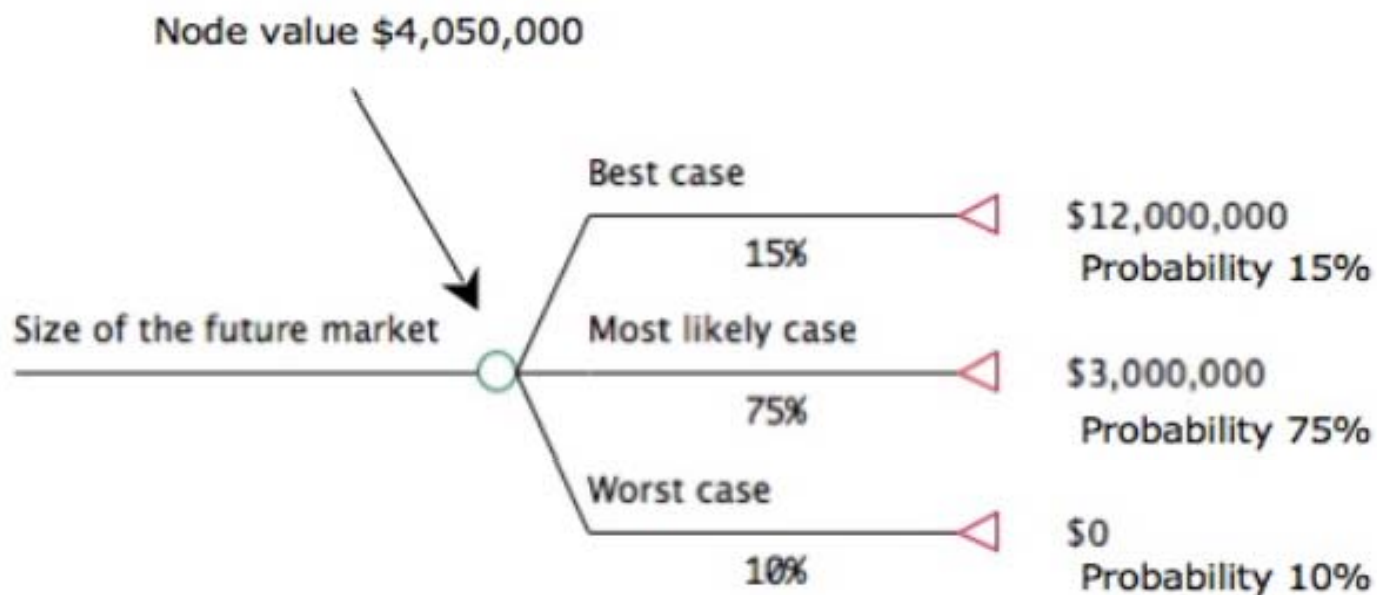
**Simple valuation question:** Should the government fund the following R&D project?

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2. The cost for the project is \$25 million

What if the project also generates \$10 million of indirect benefits?



## Brief example – trying to forecast size of future market



		Size of the Market
	<b>Year 1</b>	
<b>Best-case scenario</b>	$\$12 \text{ million} * 15\% =$	\$1.80 million
<b>Most likely case scenario</b>	$\$3 \text{ million} * 75\% =$	\$2.25 million
<b>Worst-case scenario</b>	$\$0 * 10\% =$	\$0
Weighted average calculation (expected value) =		\$4.05 million