Reverse innovation in practice

1 Original product

In the 1990s GE served the Chinese ultrasound market with machines developed in the U.S. and Japan.

Conventional ultrasound 2002 price

$100K and up

Typical customers

- Sophisticated hospital imaging centers

Typical uses

- Cardiology (such as measuring the size of passages or blood flow in the heart)
- Obstetrics (monitoring fetal health)
- General radiology (assessing prostate health, for example)

But the expensive, bulky devices sold poorly in China.

2 The emerging market disruption

In 2002 a local team in China leveraged GE's global resources to develop a cheap, portable machine using a laptop computer enhanced with a probe and sophisticated software.

Portable ultrasound 2002 price

$30K–$40K

Typical customers

- China: rural clinics
- U.S.: ambulance squads and emergency rooms

Typical uses

- China: spotting enlarged livers and gallbladder stones
- U.S.: in emergency rooms to identify ectopic pregnancies; at accident sites to check for fluid around the heart; in operating rooms to place catheters for anesthesia

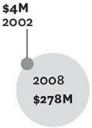
2007 price

$15K

In 2007 the team launched a dramatically cheaper model. Sales in China took off.

3 The new global market

Portable ultrasound global revenues



Thanks to technology advances, higher-priced PC-based models can now perform radiology and obstetrics functions that once required a conventional machine.

Portable ultrasound 2009 price

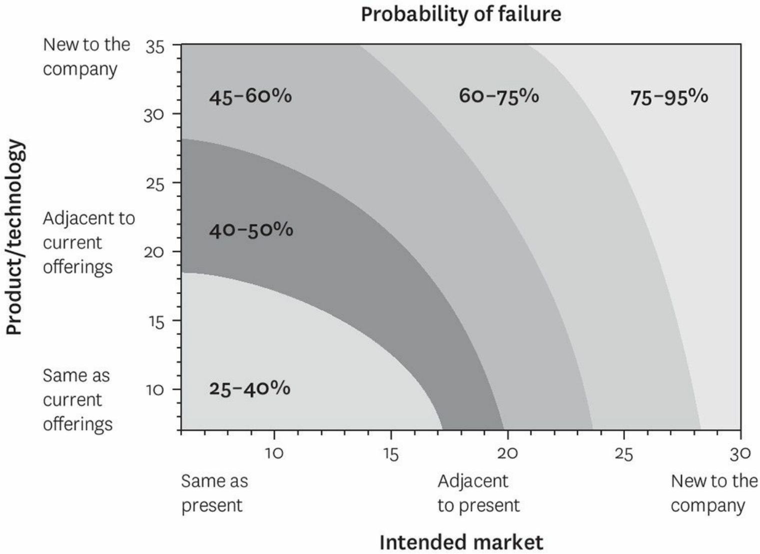
$15K–$100K

Conventional ultrasound 2009 price

$100K–$350K

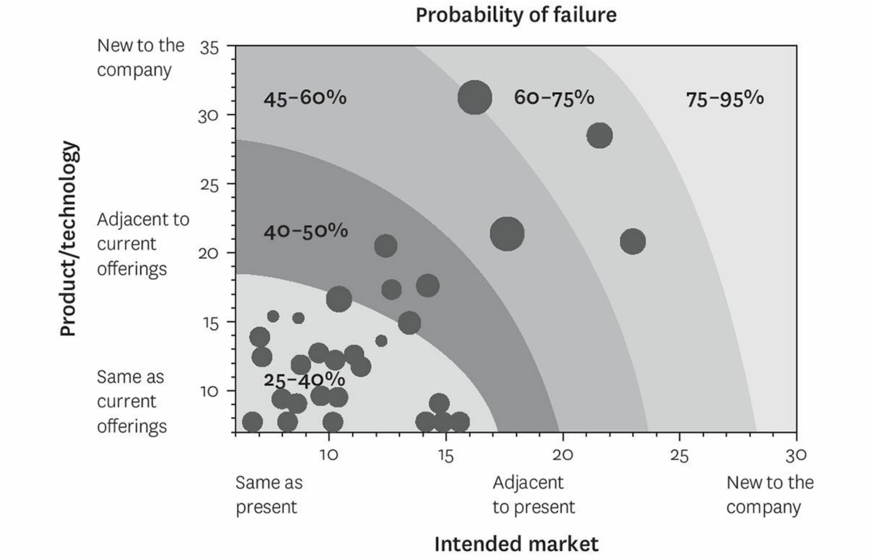
During this step . . .	Customers . . .	Companies can innovate by . . .	Example
1: Define	Determine their goals and plan resources.	Simplifying planning.	Weight Watchers streamlines diet planning by offering a system that doesn't require calorie counting.
2: Locate	Gather items and information needed to do the job.	Making required inputs easier to gather and ensuring they're available when and where needed.	U-Haul provides customers with prepackaged moving kits containing the number and types of boxes required for a move.
3: Prepare	Set up the environment to do the job.	Making set-up less difficult and creating guides to ensure proper set-up of the work area.	Bosch added adjustable levers to its circular saw to accommodate common bevel angles used by roofers to cut wood.
4: Confirm	Verify that they're ready to perform the job.	Giving customers information they need to confirm readiness.	Oracle's ProfitLogic merchandising optimization software confirms optimal timing and level of a store's markdowns for each product.
5: Execute	Carry out the job.	Preventing problems or delays.	Kimberly-Clark's Patient Warning System automatically circulates heated water through thermal pads placed on surgery patients to maintain their normal body temperature during surgery.

During this step . . .	Customers . . .	Companies can innovate by . . .	Example
6: Monitor	Assess whether the job is being successfully executed.	Linking monitoring with improved execution.	Nike makes a running shoe containing a sensor that communicates audio feedback about time, distance, pace, and calories burned to an iPod worn by the runner.
7: Modify	Make alterations to improve execution.	Reducing the need to make alterations and the number of alterations needed.	By automatically downloading and installing updates, Microsoft's operating systems remove hassles for computer users. People don't have to determine which updates are necessary, find the updates, or ensure the updates are compatible with their operating system.
8: Conclude	Finish the job or prepare to repeat it.	Designing products that simplify the process of concluding the job.	3M makes a wound dressing that stretches and adheres only to itself—not to patients' skin or sutures. It thus offers a convenient way for medical personnel to secure dressings at the conclusion of treatment and then remove them after a wound has healed.



Risk and revenue

Each dot on this risk matrix stands for one innovation in an imaginary company's portfolio. The size of each dot is proportional to the project's estimated revenue. (Companies may choose to illustrate estimated development investment or some other financial measure instead.) This portfolio, dominated by relatively low-risk, low-reward projects, is typical in its distribution.

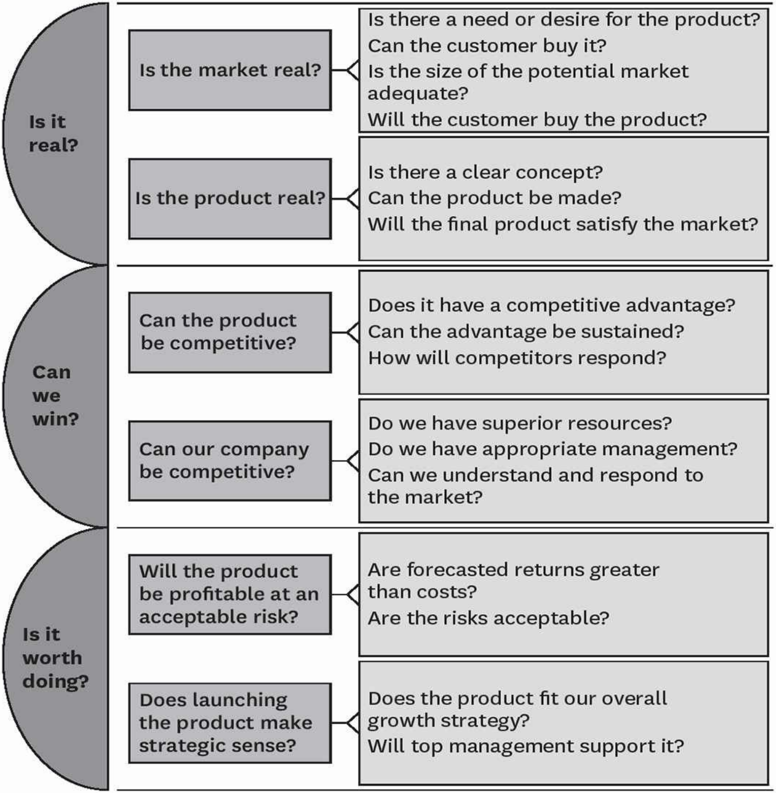


Positioning projects on the matrix

Position each innovation product or concept by completing each statement in the left-hand column with one of the options offered across the top to arrive at a score from 1 to 5. Add the six scores in the "Intended market" section to determine the project's x-axis coordinate on the risk matrix. Add the seven scores in the "Product/technology" section to determine its y-axis coordinate.

	Intended market					
	...be the same as in our present market		...partially overlap with our present market		...be entirely different from our present market or are unknown	
Customers' behavior and decision-making processes will...	1	2	3	4	5	
Our distribution and sales activities will...	1	2	3	4	5	
The competitive set (incumbents or potential entrants) will...	1	2	3	4	5	
	...highly relevant		...somewhat relevant		...not at all relevant	
Our brand promise is...	1	2	3	4	5	
Our current customer relationships are...	1	2	3	4	5	
Our knowledge of competitors' behavior and intentions is...	1	2	3	4	5	
					Total (*x*-axis coordinate)	

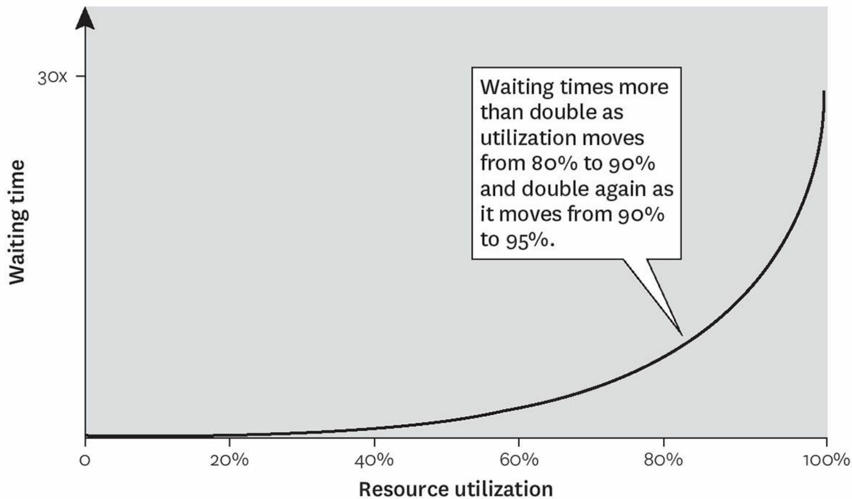
	Product/technology					
	...is fully applicable		...will require significant adaptation		...is not applicable	
Our current development capability...	1	2	3	4	5	
Our technology competency...	1	2	3	4	5	
Our intellectual property protection...	1	2	3	4	5	
Our manufacturing and service delivery system...	1	2	3	4	5	
	...are identical to those of our current offerings		...overlap somewhat with those of our current offerings		...completely differ from those of our current offerings	
The required knowledge and science bases...	1	2	3	4	5	
The necessary product and service functions...	1	2	3	4	5	
The expected quality standards...	1	2	3	4	5	
					Total (*y*-axis coordinate)	

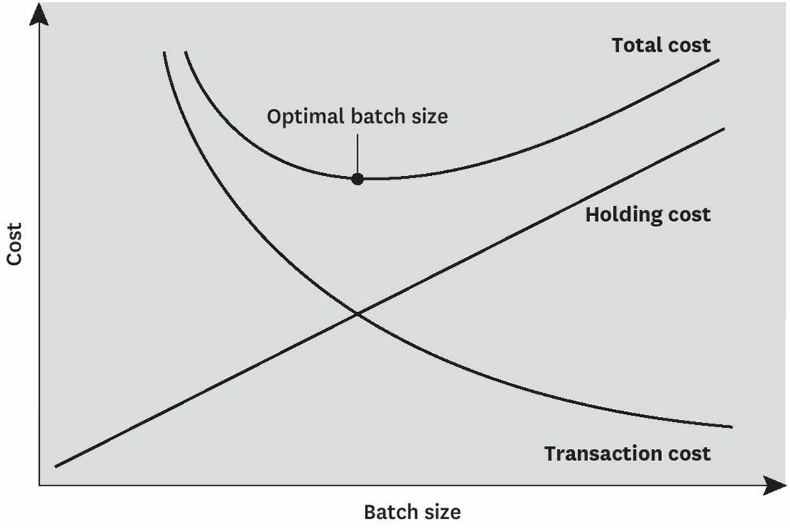


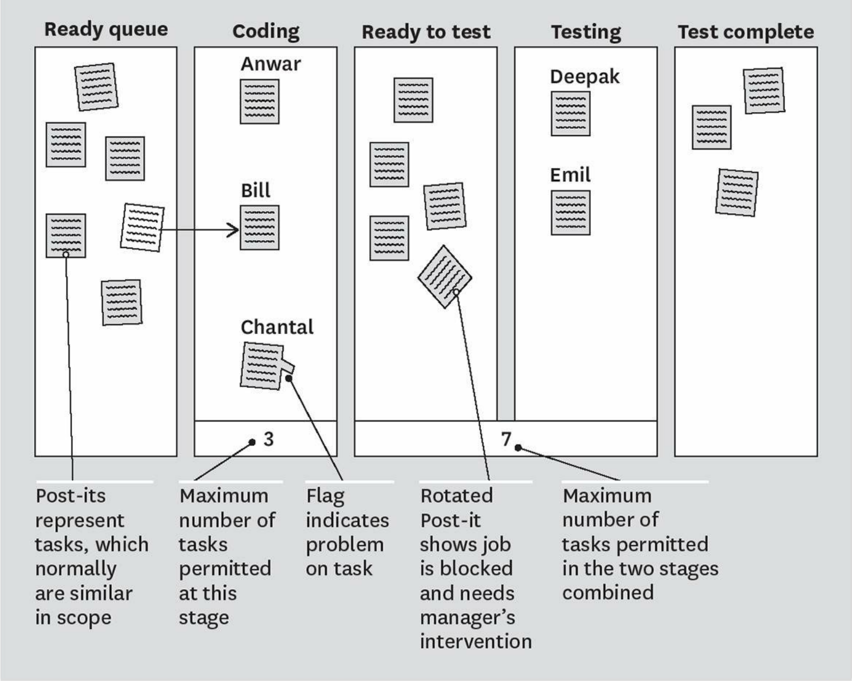
Is it real?
Is the market real?
Is there a need or desire for the product?
Can the customer buy it?
Is the size of the potential market adequate?
Will the customer buy the product?
Is the product real?
Is there a clear concept?
Can the product be made?
Will the final product satisfy the market?
Can we win?
Can the product be competitive?
Does it have a competitive advantage?
Can the advantage be sustained?
How will competitors respond?
Can our company be competitive?
Do we have superior resources?
Do we have appropriate management?
Can we understand and respond to the market?
Is it worth doing?
Will the product be profitable at an acceptable risk?
Are forecasted returns greater than costs?
Are the risks acceptable?
Does launching the product make strategic sense?
Does the product fit our overall growth strategy?
Will top management support it?

High utilization leads to delays

The curve below is calculated using Queuing Theory, the mathematical study of waiting lines. It shows that with variable processes, the amount of time projects spend on hold, waiting to be worked on, rises steeply as utilization of resources increases. Though the curve changes slightly depending on the project work, it always turns sharply upward as utilization nears 100%.




Total cost
Optimal batch size
Holding cost
Cost
Transaction cost
Batch size

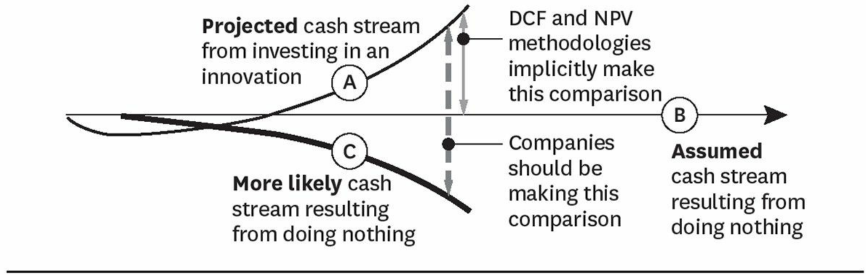


Ready queue
Coding
Ready to test
Testing
Test complete
Anwar
Bill
Chantal
Deepak
Emil
3
7
Post-its represent tasks, which normally are similar in scope
Maximum number of tasks permitted at this stage
Flag indicates problem on task
Rotated Post-it shows job is blocked and needs manager's intervention
Maximum number of tasks permitted in the two stages combined

Assumption	Measurement
1. Profit margin	10% of sales
2. Revenues	40 billion yen
3. Unit selling price	160 yen
4. 1993 world OEM market	1 billion disks
5. Fixed asset investment to sales	1:1
6. Effective production capacity per line	25 disks per minute
7. Effective life of equipment	3 years
8. Average OEM order size	10,000 disks
9. Sales calls per OEM order	4 calls per order
10. Sales calls per salesperson per day	2 calls per day
11. Selling days per year	250 days
12. Annual salesperson's salary	10 million yen
13. Containers required per order	1 container
14. Shipping cost per container	100,000 yen
15. Quality level needed to get customers to switch: % fewer flaws per disk than top competitor	50%
16. Production days per year	348 days
17. Workers per production line per day (10 per line for 3 shifts)	30 per line
18. Annual manufacturing worker's salary	5 million yen
19. Materials costs per disk	20 yen
20. Packaging costs per 10 disks	40 yen
21. Allowable administration costs (See revised reverse income statement, below)	9.2 billion yen

Required margin	10% return on sales
Required profit	4 billion yen
Necessary revenues	40 billion yen
Allowable costs	36 billion yen
Sales-force salaries	2.0 billion yen
Manufacturing salaries	3.0 billion yen
Disk materials	5.0 billion yen
Packaging	1.0 billion yen
Shipping	2.5 billion yen
Depreciation	13.3 billion yen
Allowable administration and overhead costs	9.2 billion yen (Assumption 21)
Per-unit figures	
Selling price	160 yen
Total costs	144 yen
Disk materials costs	20 yen

Milestone event—namely, the completion of:	Assumptions to be tested
1. Initial data search and preliminary feasibility analysis	4: 1993 world OEM market 8: Average OEM order size 9: Sales calls per OEM order 10: Sales calls per salesperson per day 11: Salespeople needed for 250 selling days per year 12: Annual salesperson's salary 13: Containers required per order 14: Shipping cost per container 16: Production days per year 18: Annual manufacturing worker's salary
2. Prototype batches produced	15: Quality to get customers to switch 19: Materials costs per disk
3. Technical testing by customers	3: Unit selling price 15: Quality to get customers to switch
4. Subcontracted production	19: Materials costs per disk
5. Sales of subcontracted production	1: Profit margin 2: Revenues 3: Unit selling price 8: Average OEM order size 9: Sales calls per OEM order 10: Sales calls per salesperson per day 12: Annual salesperson's salary 15: Quality to get customers to switch
6. Purchase of an existing plant	5: Fixed asset investment to sales 7: Effective life of equipment
7. Pilot production at purchased plant	6: Effective production capacity per line 16: Production days per year 17: Workers per production line per day 18: Annual manufacturing worker's salary 19: Materials costs per disk 20: Packaging costs per 10 disks
8. Competitor reaction	1: Profit margin 2: Revenues 3: Unit selling price
9. Product redesign	19: Materials costs per disk 20: Packaging costs per 10 disks
10. Major repricing analysis	1: Profit margin 2: Revenues 3: Unit selling price 4: 1993 world OEM market
11. Plant redesign	5: Fixed asset investment to sales 6: Effective production capacity per line 19: Materials costs per disk


Projected cash stream from investing in an innovation
A
DCF and NPV methodologies implicitly make this comparison
B
C
Companies should be making this comparison
Assumed cash stream resulting from doing nothing
More likely cash stream resulting from doing nothing