New Product Development

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The path from idea to a product

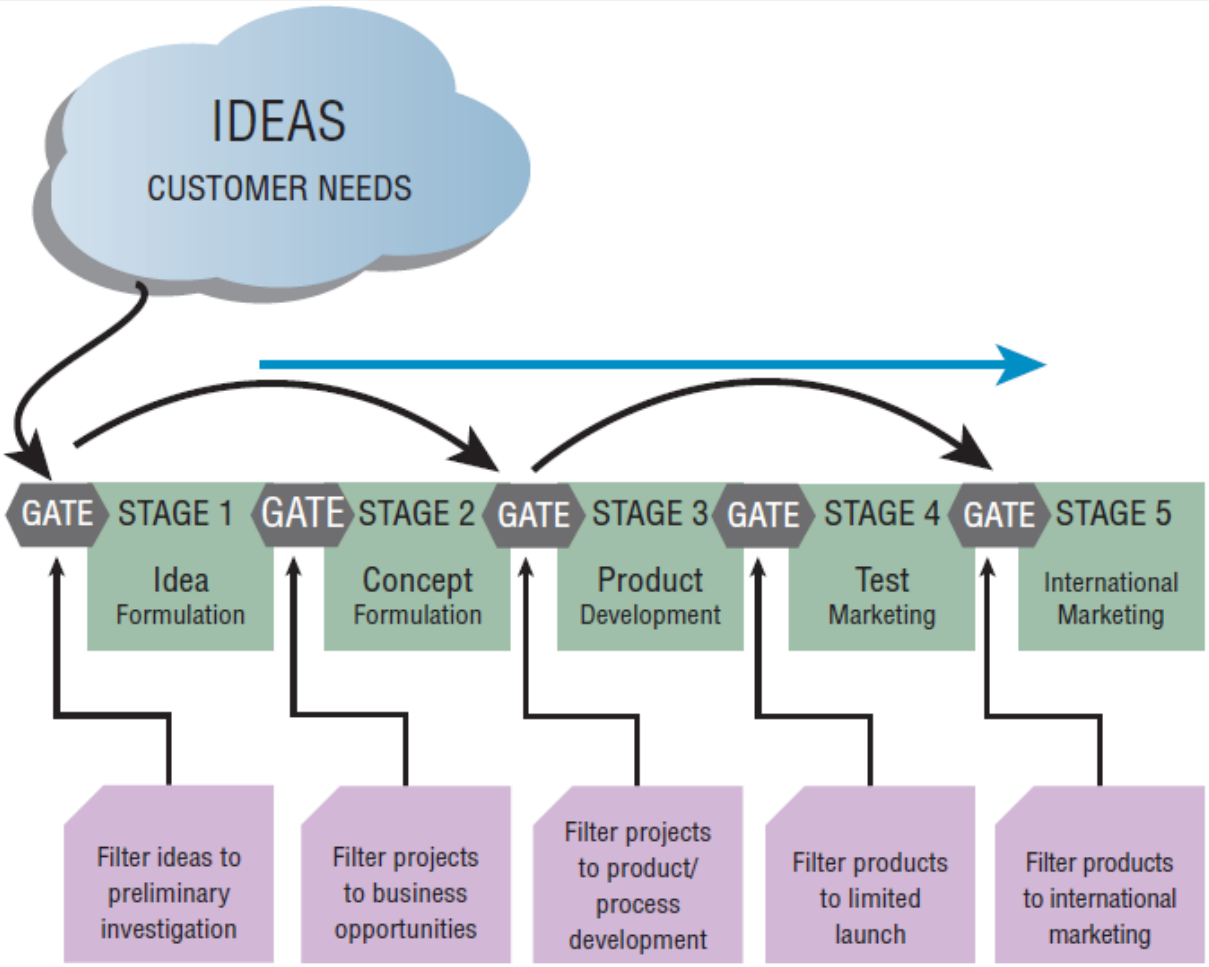


FIGURE 11.1 Stage-gate product development process

Sources: Derived from Cooper, R., *Winning at New Products: Accelerating the Process from Idea to Launch*, 2001, Cambridge, MA: Perseus Books; Doing it right: Winning with new products, 2000, Ivey *Business Journal*, **64**(6), 1–7.

The Development Funnel

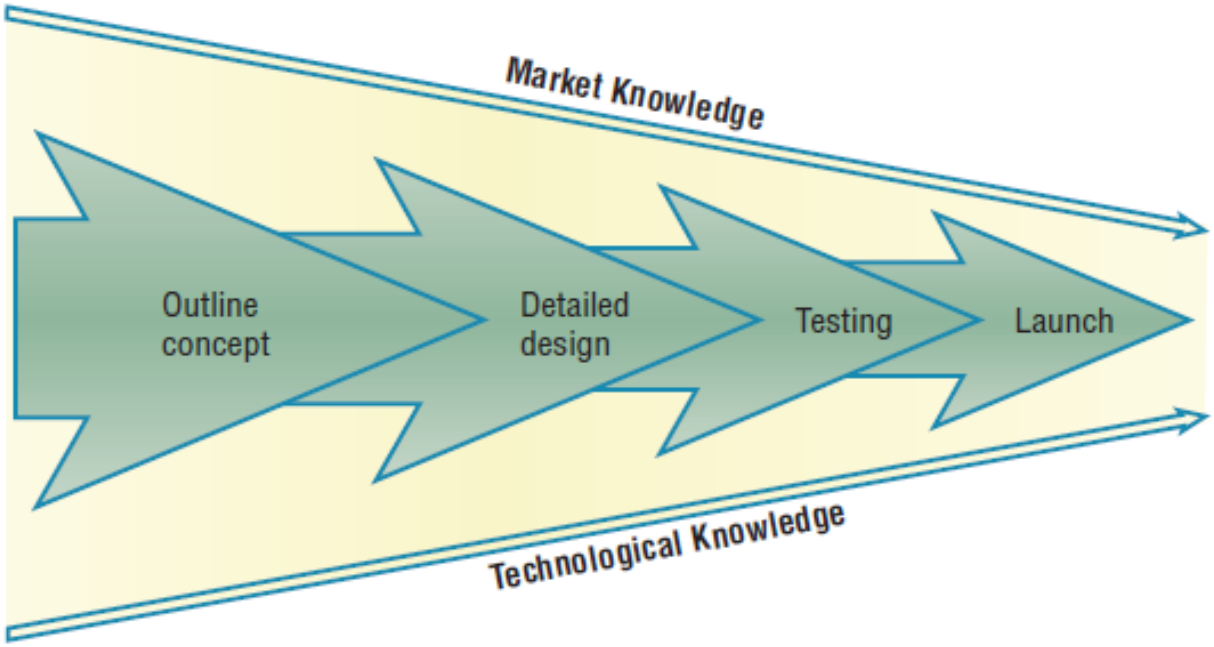


FIGURE 11.2 Product development funnel

Source: Derived from Wheelwright, S. C. and K. B. Clark (1992) *Revolutionizing Product Development*, New York: Free Press.

An Alternative View of the Product Development Funnel.

A Simplified Four Stage Model

- Concept generation – identifying the opportunities for new products and services.
- Project assessment and selection – screening and choosing projects which satisfy certain criteria.
- Product or service development – translating the selected concepts into a physical product or a new service.
- Product or service commercialization – testing, launching and marketing the new product or service.

Project Selection Two filters:

- Aggregate product plan
  - attempts to integrate the various potential projects to ensure that the collective set of development projects meet the goals and objectives of the firm, and help to build the capabilities needed.

- Developing specific product concepts.
  - The two most common processes at this level are the development funnel and the stage gate system.

Product Development

- This stage includes all the activities necessary to take the chosen concept and deliver a product or service for commercialization.

Success factors in new product development

- *Product advantage*
- *Market knowledge*
- *Clear product definition*
- *Risk assessment*
- *Project organization*
- *Project resources*
- *Proficiency of execution*
- *Top management support*

What factors lead to success?

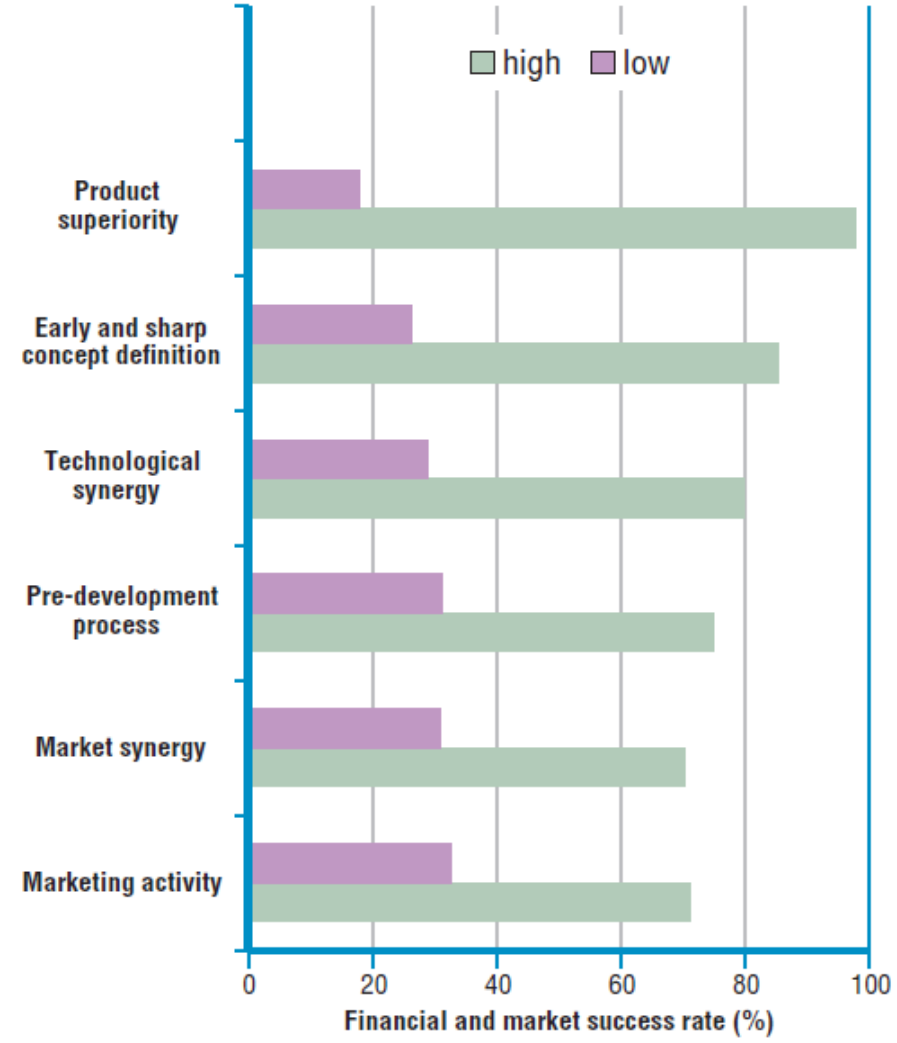


FIGURE 11.3 Factors influencing new product success

Product development influential factors

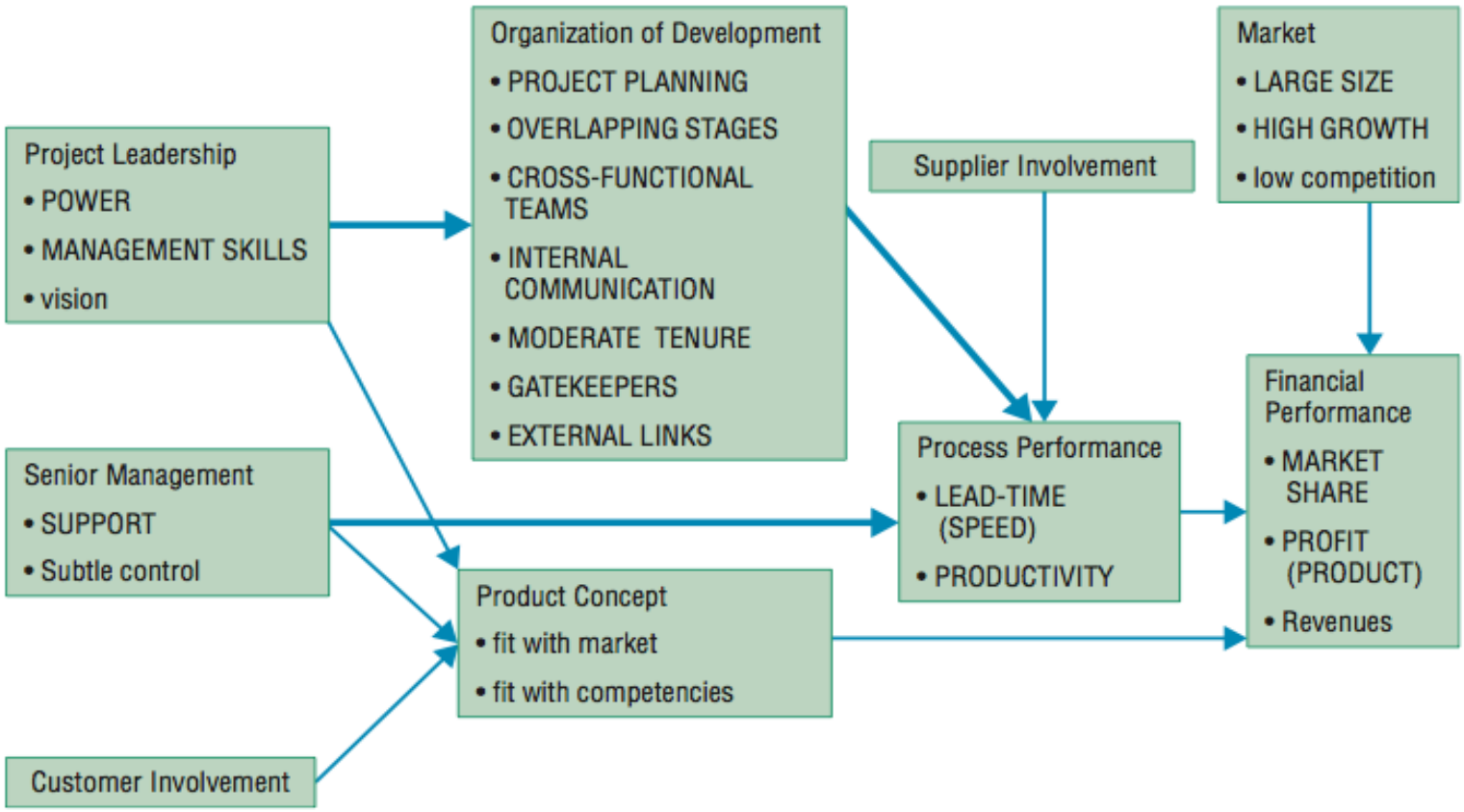


FIGURE 10.4 Key factors influencing the success of new product development

Source: Brown, S.L. and Eisenhardt, K.M. (1995) Product development: Past research, present findings and future directions. *Academy of Management Review* 20: 343–378

Obstacles to New Product Development (Important but not in text)

- **Social Challenges**
  - Products are developed to meet a specific need or want. Just because we have a need or want in the U.S., doesn't mean that need or want is universal. Different countries are at different stages of economic development, and the need or want we have might not have developed in enough other countries to create a viable target market. Other countries have different cultures and different food preferences, grooming habits, living quarters, recreational opportunities, lifestyles and clothes. English speakers might be few. Brand names may not translate appropriately. Countries may have no interest in a particular good or service that is selling well in America.
- **Technical Challenges**
  - American companies have done a good job of standardizing technology, but so have other countries, and those standards don't always match. Standard electrical voltage differs from country to country, so products must be designed to run on different voltages, and they need different plugs to fit different receptacles. Local water pressure might be different. Lettering on dials, knobs, levers or buttons might need to be in different languages. Some use Fahrenheit systems to measure temperature while others use Celsius. Some use metric measurements, while some use other measurement systems. Raw materials readily available in America might not be available in other countries. Phone, radio, television and ISP signals might be totally different from country to country.

Obstacles to New Product Development cont. (Important but not in text)

- **Legal and Regulatory Challenges**
  - Some countries prohibit the importation of certain items to protect domestic industries. Others might require government approval to operate or require you work with local partners. Trademark, copyright and patent protection laws might be nonexistent. Different environmental regulations might have to be observed. Certain products might be banned for political or religious reasons. Permits or licenses might be needed to perform basic activities. You may not be able to overcome some of these challenges, so it is important to understand them before you invest resources.
- **Distribution Challenges**
  - In America, if you can get Wal-Mart and Target to carry your product, you have instant national distribution. Most other countries don't have that type of national distribution available to them. You have to work with dozens of regional chains, distributors and independent stores. Many countries, such as India, have large outlying areas that are served by thousands of small mom-and-pop stores or retail trucks. It can be a real challenge to get your product from the import docks to a place where a customer can buy it.
- **Promotional Challenges**
  - In America, we have a variety of effective methods to promote a product and communicate with our customers. We can use television, radio, direct mail, magazines, social media, billboards, telemarketing and product placement in movies. Many other countries just don't have these promotional methods, certainly not to the extent we have here. You may have to use a grass roots approach, which is much harder. In addition, there may be cultural limitations. Our promotions tend to have a sexual orientation. The beautiful model as spokesperson, shot in reveling swimwear or with plunging neckline might be taboo in many companies. You may find you have to use methods with which you have no experience. You might have to completely redo packaging or promotional materials at considerable expense.

Differences between products and services

- Tangibility
  - can see and feel the product but not the service.
- Perceptions of service quality:
  - tangible aspects -appearance
  - Responsiveness –prompt service
  - Competence -
  - Assurance –courtesy and knowledge of the staff, trust, confidence
  - Empathy – do they seem to care?
- Simultaneity –
  - services are often produced and consumed immediately, products are often inventoried.
- Storage
  - services cannot be stored
- Customer contact
  - service require more customer contact
- Location
  - services are generally produced near where they are consumed.

TABLE 11.1 Characteristics of service 'high innovators'

Business descriptor	Low innovators	High innovators
Innovation outcomes		
• % sales from services introduced < 3 years ago	<1%	17%
• % new services versus competitors	>0%	5%
Customer base		
• Focus on key customers	Average	High
• Relative customer base	Similar to competitors	More focused than competitors
Value chain		
• Focus on key suppliers	Average	High/strategic
• Value-added/sales %	72%	60%
• Operating cost added/sales	36%	25%
• Vertical integration versus competitors	Same or more	Same or less
Innovation input		
• 'What' R&D	0.1% sales	0.7% sales
• 'How' R&D	0.1% sales	0.5% sales
• Fixed assets/sales	growing at 10% p.a.	growing at >20% p.a.
• Overheads/sales %	8%	11%
Innovation context		
• Recent technology change	20%	40%
• Time to market	>1 year	<1 year
Competition		
• Competitor entry	10%	40%
• Imports/exports versus market	2%	12%
Quality of offer		
• Relative quality versus competitors	Declining	Improving
• Value for money	Just below competitors	Better than competitors
Output		
• Real sales	9%	15%

Source: Clayton (2003) in Tidd, J. and Hull, F.M., eds, *Service Innovation: Organizational Responses to Technological Opportunities and Market Imperatives,* Imperial College Press, London.

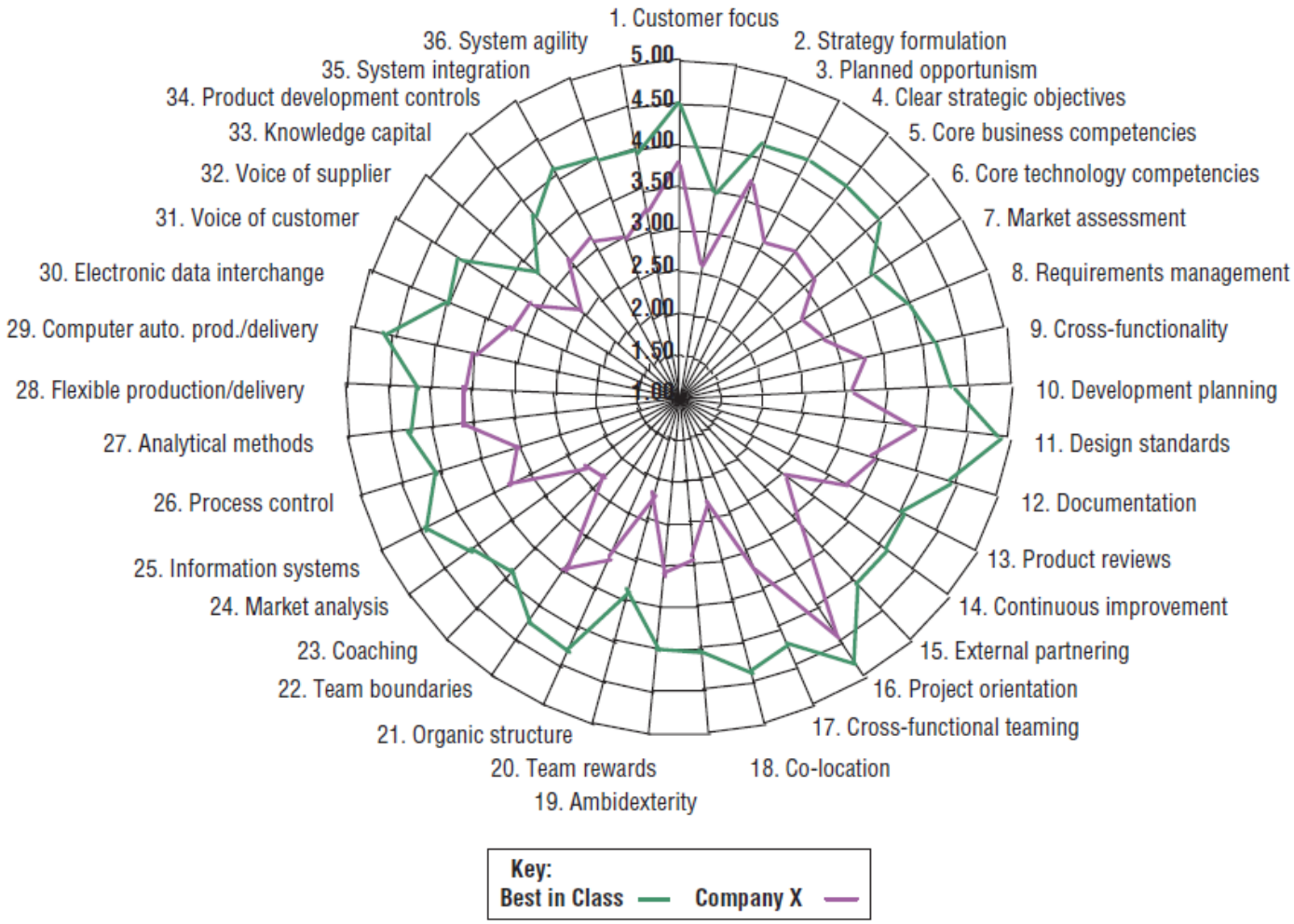


FIGURE 11.4 A framework for assessing new service development

Source: Tidd, J. and F. M. Hull (2006) Managing service innovation: the need for selectivity rather than 'best practice'. *New Technology, Work and Employment* **21**(2): 139–161. Reproduced by permission of John Wiley & Sons, Ltd.

Tools to help with concept generation

- Surveys and focus;
- Latent needs analysis;
- Lead-users;
- Customer-developers;
- Competitive analysis;
- Industry experts or consultants;
- Extrapolating trends;
- Building scenarios;
- Market experimentation.

Tools to help project selection

- Financial methods
  - Discounted cash flows, such as net present value/internal rate of return.
  - Cost-benefit analysis.
  - Simple calculations of the payback period.

- Non-Financial Methods
  - Ranking.
  - Profiles.
  - Simulated outcomes.
  - Strategic clusters.
  - Interactive.

Tools to help product development

- Design for Manufacture (DFM).
- Rapid Prototyping.
- Computer-aided Techniques (CAD/CAM).
- Quality Function Deployment (QFD). For more on QFD see the toolbox:
  - http://www.innovation-portal.info/resources/quality-function-deployment-qfd/

Overview of tools and their usefulness

Table 11.2 of the B&T book summarizes and ranks usefulness as well as usage of the tools and methodologies for product and service development

TABLE 11.2 Use and usefulness of techniques for product and service development

	High Novelty		Low Novelty	
	Usage (%)	Usefulness	Usage (%)	Usefulness
Segmentation*	89	3.42	42	4.50
Market experimentation	63	4.00	53	3.70
Industry experts	63	3.83	37	3.71
Surveys/focus groups*	52	4.50	37	4.00
User-practice observation	47	3.67	42	3.50
Partnering customers*	37	4.43	58	3.67
Lead users*	32	4.33	37	3.57
Probability of technical success	100	4.37	100	4.32
Probability of commercial success	100	4.68	95	4.50
Market share*	100	3.63	84	4.00
Core competencies*	95	3.61	79	3.00
Degree of internal commitment	89	3.82	79	3.67
Market size	89	3.76	84	3.94
Competition	89	3.76	84	3.81
Gap analysis	79	2.73	84	2.81
Strategic clusters*	42	3.63	32	2.67
Prototyping*	79	4.33	63	4.08
Market experimentation	68	4.31	63	4.08
QFD	47	3.33	37	3.43
Cross-functional teams*	63	4.47	37	3.74
Project manager (heavyweight)*	52	3.84	32	3.05

Usefulness Scale: 1–5, 5 = critical, based on manager assessments of 50 development projects in 25 firms. * denotes difference in usefulness rating is statistically significant at 5% level.

Source: Adapted from Tidd, J. and K. Bodley (2002) The effect of project novelty on the new product development process, *R&D Management*, **32**(2), 127–38.

QFD - Quality Function Deployment

- Identify customer requirements, primary and secondary, and any major dislikes.
- Rank requirements according to importance.
- Translate requirements into measurable characteristics.
- Establish the relationship between the customer requirements and technical product characteristics, and estimate the strength of the relationship.
- Choose appropriate units of measurement and determine target values based on customer requirements and competitor benchmarks.

The QFD matrix

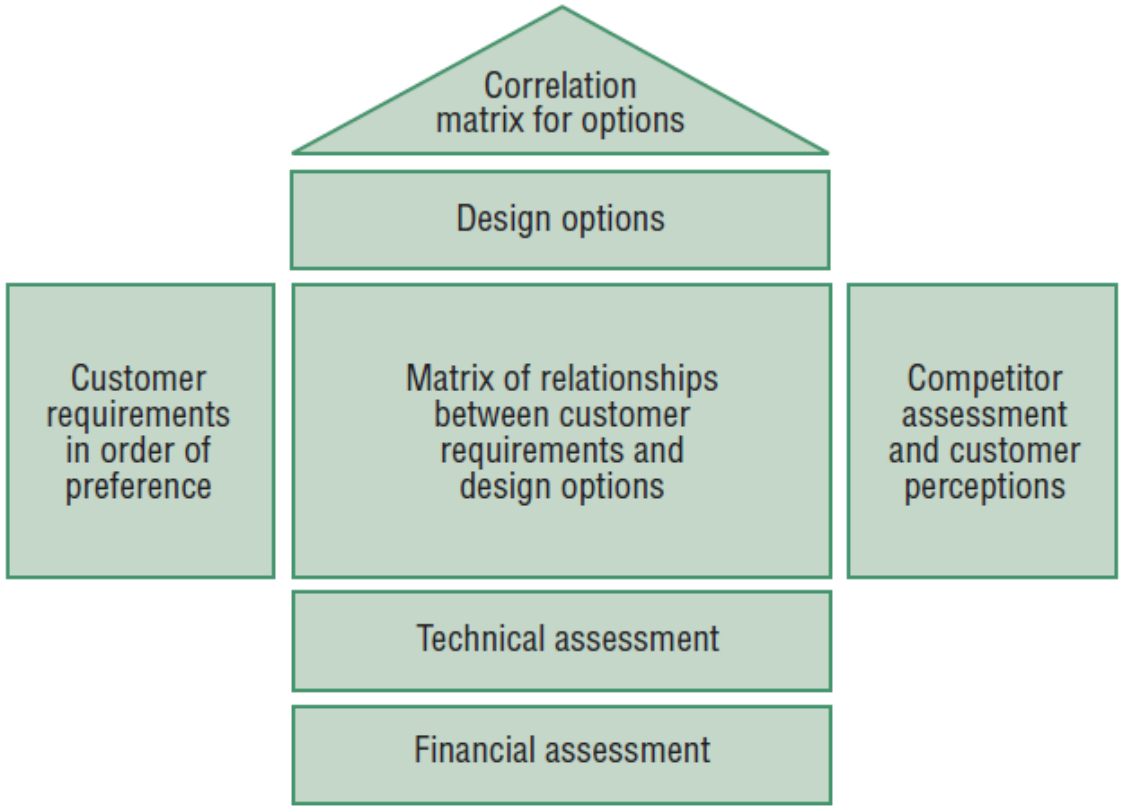


FIGURE 11.5 Quality function deployment (QFD) matrix

Figure 11.5 of the book presents QFD matrix that was originally developed in Japan and claimed to have helped Toyota reduce its development time and costs by 40 %

Diffusion of innovations

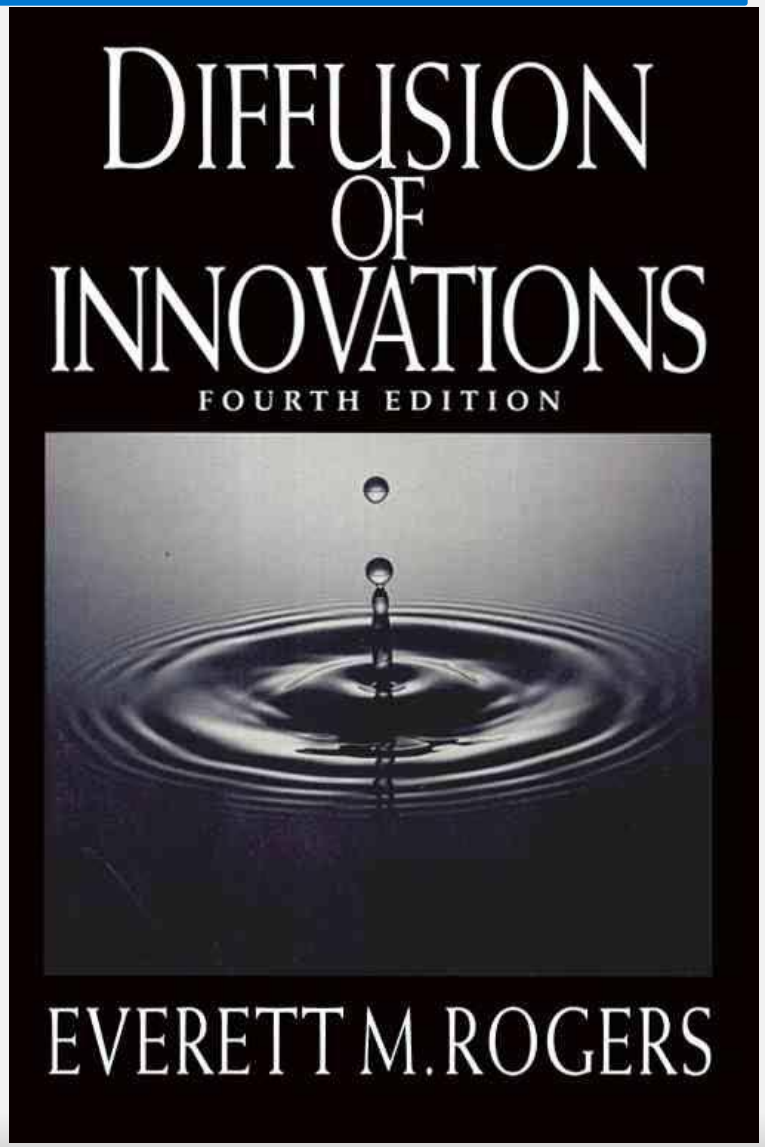
- Diffusion is the means by which innovations are translated into social and economic benefits.

- We know that the impact of the use of innovations is around four times that of their generation

- However, the benefits of innovations can take 10–15 years to be fully effected, and in practice most innovations fail to be adopted widely, and so have limited social or economic impact.

Everett Rogers, Professor of Communication, Ohio State Univ.

- Rogers' definition of diffusion is used widely:
  - 'the process by which an innovation is communicated through certain channels over time among members of a social system. It is a special type of communication, in that the messages are concerned with new ideas'
  - "Diffusions of Innovations;" Everett Rogers; Simon & Schuster; (1962).



Rogers' 3 types of innovation decision

- **Individual**,
  - in which the individual is the main decision-maker, independent of peers. Decisions may still be influenced by social norms and interpersonal relationships, but the individual makes the ultimate choice. For example, the purchase of a consumer durable such as a mobile phone.
- **Collective,**
  - where choices are made jointly with others in the social system, and there is significant peer pressure or formal requirement to conform. For example, the sorting and recycling of domestic waste.
- **Authoritative,**
  - where decisions to adopt are taken by a few individuals within a social system, owing to their power, status or expertise (e.g. adoption of ERP systems by businesses, or MRI systems by hospitals).

Models of Diffusion

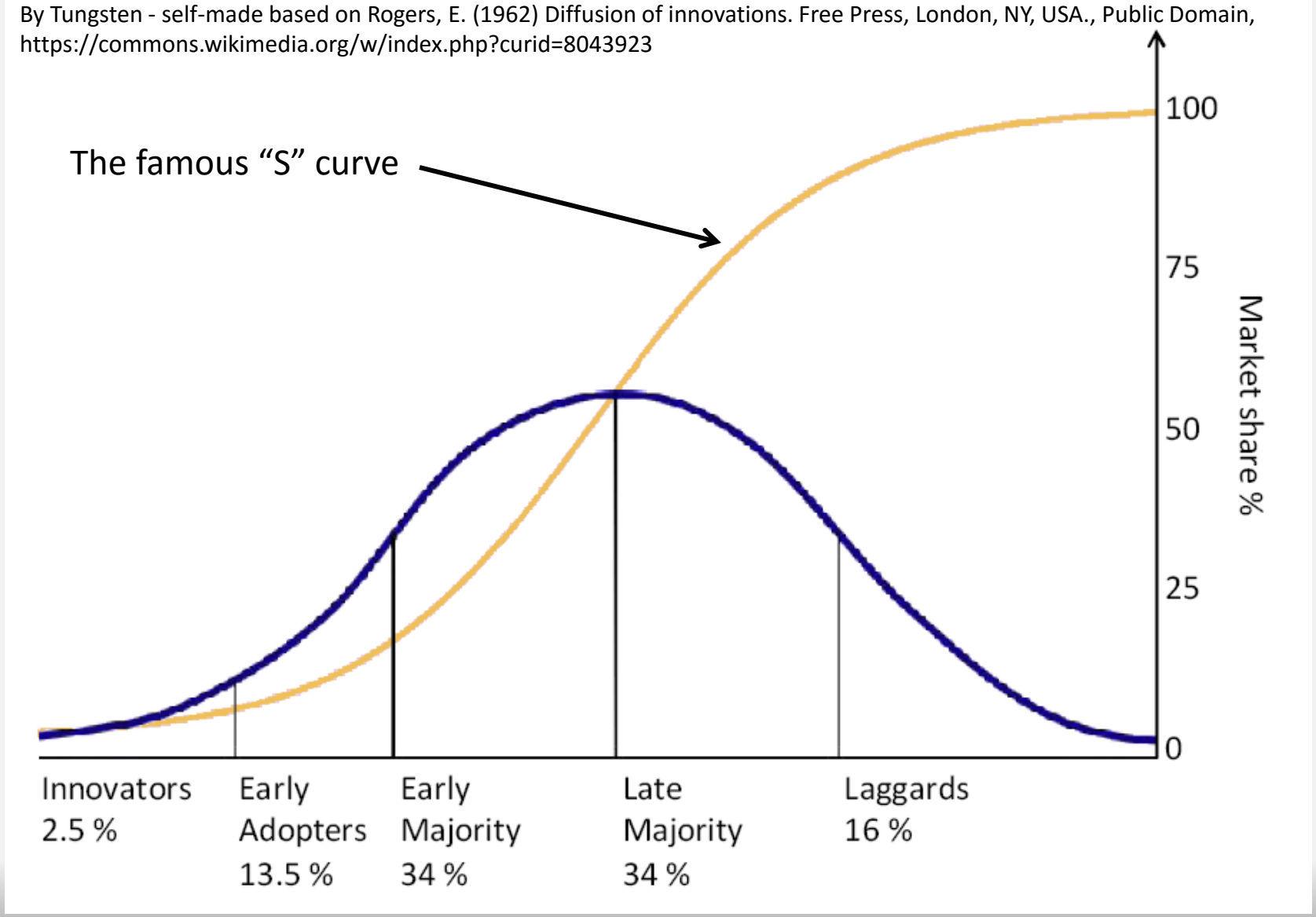
In practice the precise pattern of adoption of an innovation will depend on the interaction of demand-side and supply-side factors:

- **Demand-side factors** –
  - direct contact with or imitation of prior adopters, adopters with different perceptions of benefits and risk.

- **Supply-side factors** –
  - relative advantage of an innovation, availability of information, barriers to adoption, feedback between developers and users.

Rogers Model of Diffusion

By Tungsten - self-made based on Rogers, E. (1962) Diffusion of innovations. Free Press, London, NY, USA., Public Domain, https://commons.wikimedia.org/w/index.php?curid=8043923



Barriers to Adoption

- Economic –
  - personal costs versus social benefits, access to information, insufficient incentives
- Behavioral –
  - priorities, motivations, rationality, inertia, propensity for change or risk
- Organizational –
  - goals, routines, power and influence, culture and stakeholders
- Structural –
  - infrastructure, sunk costs, governance.

Factors affecting diffusion

In predicting the rate of adoption of an innovation, five factors explain 49–87% of the variance:

- Relative advantage
  - the degree to which an innovation is perceived as better than the product it supersedes, or competing products. Typically measured in narrow economic terms, for example cost or financial payback.
  - Non-economic factors such as convenience, satisfaction and social prestige may be equally important.
- Compatibility –
  - how compatible is the innovation to existing systems?
- Complexity
  - How complex is it to implement?
- Trialability
  - the degree to which an innovation can be experimented with on a limited basis. An innovation that is trialable represents less uncertainty to potential adopters, and allows learning by doing. Innovations which can be trialled will generally be adopted more quickly than those which cannot.
  - Sometimes called 'divisibility' – how far can the risk of adoption be broken down into small steps rather than requiring a full commitment at the outset
- Observability.
  - the degree to which the results of an innovation are visible to others. The easier it is for others to see the benefits of an innovation, the more likely it will be adopted.
  - The simple epidemic model of diffusion assumes that innovations spread as potential adopters come into contact with existing users of an innovation.

Checklist for Relative Advantage

- How well does my plan show how much better off people will be when they adopt it?
- Why is this plan better than what has been done before?
- What advantages or benefits may there be to accepting the plan?
- Who will gain from the implementation of the plan?
- How will I (or others) be rewarded by adopting the plan?
- How can I emphasize the plan's benefits to all?

Checklist for Compatibility

- How well does my plan demonstrate that it is compatible with current values, past experiences and needs?
- Is the plan consistent with current practice?
- Does the plan meet the needs of a particular group?
- Does it offer better ways to reach our common goals?
- Who will naturally support and agree with the plan?
- Can it be favorably named, packaged or presented?

Checklist for Trialability

- How well does my plan allow for trialability?
- Can the plan be tried out or tested?
- Can uncertainty be reduced?
- Can we begin with a few parts of the plan?
- How can others be encouraged to try out the plan?
- Can the plan be modified by you or others?

Checklist for complexity

- How well does my plan provide for easy communication, comprehension and use?
- Is the plan easy for others to understand?
- Can it be explained clearly to many different people?
- Will the plan be easily communicated?
- How can the plan be made more simple or easy to understand?
- Is the plan easy to use or follow?

Checklist for Observability (Visibility)

- How well does my plan provide results that are easily observed and visible to others?
- Is the plan easy for others to find or obtain?
- Can the plan be made more visible to others?
- How can I make the plan easier for others to see?
- Will others be able to see the effects of the plan?
- Are there good reasons for not making the entire plan visible?

Viral marketing is a derivative of this issue that is a critical way of bringing your new product to the publics attention.

What other factors do we need to pay attention to?

- What other resources will I need; how can I get them?
- What obstacles exist; how can we prevent or overcome them?
- What new challenges will be created; and dealt with?
- How can I encourage commitment to the plan?
- What feedback about the plan is needed?