

Module 3. New Product Development and Implementation

Introduction

The human race has had over 10,000 years of experience in bringing new products and services into the marketplace, with thousands of successes and millions of failures. This module looks at the wealth of accumulated knowledge to demonstrate how best practice will enable a product to be delivered quicker and cheaper by following a process that works consistently. Each one of us generates ideas, some good, some simply stupid, but how do we assess which ideas to pursue, both in life and in commerce. How do you choose between many good ideas that staff suggest in their working lives, how do you analysis the business case, get customers to both shape and endorse products before spending large amounts of money in development, how do we measure the financial performance of products and services to ensure that the organisation records a profit rather than a loss? These questions will be answered in this module, and the case studies. Individual and group exercises will stimulate you; and ultimately enable you to make decisions based on good business practice. During this module each of the stages in New Product Development [NPD] will be described, and at each stage checking and rechecking whether we're still going to deliver what the customer wants, at a price they will pay, and at a profit to the organisation.

Note that we will use NPD in this course to mean new product and service development, as exactly the same processes and procedures are used for both, however, NPD is the usual abbreviation in the commercial sector.

The world of commerce today looks totally different to the one which our parents entered, more and more business products and services are delivered over the ever growing world wide web, often at no apparent [but complete the IP module] cost to the consumer.

This module is targeted at professionals working in both the private and public sector whose job it is to promote innovation and introduce new products/services to the market. The aim of the module is to learn about the key concepts enveloping the skills required to create new products or services This module consists of three chapters:

A. Process of New Product Development

This chapter deals with the steps involved in the development of new products and services. This is a structured process which includes: Idea Generation, Idea Screening, Cooperation, collaboration and networking , Market research and Business Analysis, Concept Development, Listening and Capturing Customer requirements and needs, Testing, Technical Implementation, Commercialization. Many different methods for New Product Development

have been proposed since the mid twentieth century, culminating in proven methods for increasing the likelihood that a product or service will be successful. At every stage of the process two fundamental questions need to be answered positively:

1. Will our customers need, want and buy the New Product or Service?
2. Will this Product or Service make a profit for the company, or reduce costs?

NPD in this module will refer to both incremental improvement to existing products through to radical new products, the only difference is that more time, money and effort is expended in getting the latter to market. We can consider simple ideas like offering a product in new colours, offering a new feature to an existing product or completely radical products which change customer buying habits, and could destroy an existing market. To illustrate this consider the iPod

1. Offer the iPod in 6 different colours [simple product enhancement through greater choice]
2. Add the ability to access the internet as a new feature [incremental improvement to existing successful product, needs development]
3. Replace vinyl records, cassettes, walkmans, MP3 players with the iPod [radical technological and societal change to the consumers' method of listening to music]

B. New product development methods

This chapter will focus on a formal process that is used to direct the development process from ideas to launch. The trademarked method to be analyzed is Cooper's Stage-Gate® process and Six Sigma. Stage-Gate was first developed by Robert G. Cooper, Professor of Business, McMaster University Canada and is used in more than half the corporate organizations in the United States involved in product development. Six Sigma is a business management strategy originally developed by Motorola, USA in 1986. Six Sigma seeks to improve the quality of process outputs by identifying and removing the causes of defects (errors) and minimizing variability in manufacturing and business processes.

C. Innovation commercialization: introducing new products and services to the market

This chapter will delve into commercialization techniques and practical aspects of bringing an idea into the market. The commercialization process will include a series of elements to successful launch and promotion of the new product/service.

Overall this module includes 18 tasks to be completed individually as you progress through the module and 11 multiple choice questions at the end. These are designed to assist in understanding of the points of each section. These tasks will help to increase knowledge and practical problem solving skills in addition to the other sources of information such as literature and internet links. Details about the word count and time are given after each exercise. By the end of the module you will have examined a new product or service, identified a work plan to get the product or service to market and used 3 different tools and techniques common in your chosen company. The tasks 1.4, 1.11, 1.12, 2.3 and 3.3 will be used for your final assignment

Learning Objectives

- Understand the significance of NPD process
- Understand the process of idea generation
- Learn how to effectively assess a new business idea and conduct Idea Screening

- Evaluate a new business idea: Evaluate the commercial viability and risk of an innovative product concept, taking account of sales volume and market price
- Understand how the Concept Development and Testing stages are conducted
- Demonstrate how to prepare a plan using lifecycle management techniques for a new idea and conduct a preliminary Business Analysis
- Learn how research and development leads to Technical Implementation
- Learn how to take an idea to the market: commercialisation
- Use project management techniques to plan, record and control the product innovation process

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1 Process of New Product Development

New Product Development (NPD) is the term used to describe the complete process of bringing a new product or service to market. There are two parallel paths involved in the NPD process: one involves the idea generation, product design and detail engineering; the other involves market research and marketing analysis. Companies typically see new product development as the first stage in generating and commercializing new products within the overall strategic process of product life cycle management used to maintain or grow their market share¹. Product Development begins with an understanding of market needs, within a sound business model, a well-defined financial strategy, and well-thought-out strategic goals².

This chapter will equip students with a basic understanding of the different elements involved in the NPD process and enable them to take informed decisions based on the analysis of market and business needs. It will help the individual to better adapt to change and to a dynamic market in today's global economy and do so rationally and reliably by also exploring hidden value in existing product lines

1.1 Idea Generation

Virtually all innovation processes include generating and selecting opportunities or ideas. Generating the ideas that feed subsequent development processes thus plays a critical role in innovation. The success of idea generation in innovation usually depends on the quality of the *best* opportunity identified. For most innovation challenges, an organization would prefer 99 bad ideas and 1 outstanding idea to 100 merely good ideas. In the world of innovation, the extremes are what matter, not the average or the norm³. This situation is very different from that in, for example, manufacturing, where most firms would prefer to produce 100 units with good quality over making 1 unit with exceptional quality followed by 99 that have to be scrapped. When generating ideas, an organization makes choices by intention or default about its creative problem solving process.

New ideas for innovation can stem from many sources, including new manufacturing capabilities and recognition of new market needs, as well as scientific and technological discoveries (see module 1, Chapter 1.4). Ideas for new inventions more often arise from recognition of new market opportunities, advancing manufacturing capabilities, or advances in technology that proceed apart from advances in the underlying science. Apart from observing the external environment, it is equally necessary to also explore the company's

¹ Belliveau, P., Griffin, A. and Somermeyer, S. (2004) *PDMA ToolBook 2 for New Product Development*, John Wiley, New York

http://en.wikipedia.org/wiki/New_product_development#The_process

² Marc A. Annacchino (2007) *The pursuit of new product development: the business development process*, Butterworth-Heinemann

³ Dahan, E. and H. Mendelson (2001). "An Extreme Value Model of Concept Testing." *Management Science* 47(1): 102-116.

Terwiesch, C. and C. H. Loch (2004). Collaborative Prototyping and the Pricing of Custom-Designed Products, *Institute for Operations Research and the Management Sciences*: 145-158.

Terwiesch, C. and K. T. Ulrich (2009). *Innovation Tournaments: Creating and Selecting Exceptional Opportunities*, Harvard Business School Press.

internal capabilities by using a SWOT analysis (Strengths, Weaknesses, Opportunities & Threats), Market and consumer trends, company's R&D department, competitors, focus groups, employees, salespeople, corporate spies, trade shows, or Ethnographic discovery methods (searching for user patterns and habits)

Task 1.1: Provide one example of a new product or service idea based on the SWOT analysis of your company or case study that has already been developed or can be developed in the future? (10 minutes)

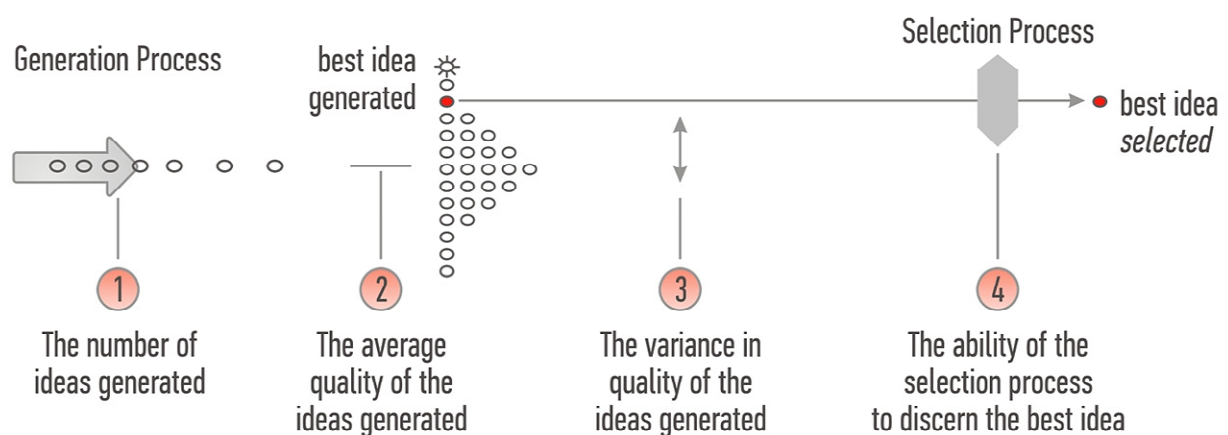
Task 1.2: Provide one example of a radical change in your company's/case study's products or services offered, why do you consider it radical? (10 minutes)

Task 1.3: Provide an example of an incremental change in your company's/case study's products or services, what was the benefit to the organization of implementing this incremental improvement? (10 minutes)

1.2 Idea Screening

The learning objectives of this chapter are to help students understand the process of new product/service evaluation, appreciate the role of the first 'screening', being able to articulate the limitations of screening and being able to design and implement a screening process.

The main objective of this phase is to eliminate unsound concepts prior to devoting resources to them. There are a number of factors affecting the Idea Screening process (see Figure 1 below)



(source: Karan Girotra, Christian Terwiesch, Karl T. Ulrich, (2009) Idea Generation and the Quality of the Best Idea, INSEAD Business School Research Paper No. 2009/65/TOM)

Figure 1: Factors underlying the performance of the idea generation process

In order to assess the ideas, the following basic questions must be answered:

- Will the customer in the target market benefit from the new product?
- What is the size and growth forecasts of the market segment/target market?
- What is the current or expected competitive pressure for the new product idea?
- What are the industry sales and market trends the new product idea is based on?
- Is it technically feasible to manufacture the new product?
- Will the new product be profitable when manufactured and delivered to the customer at the target price?

The idea selection can be done in a formal or informal process depending usually on the company's size but also culture. Usually as the process is moving forward more information will be required from the idea generators. A number of stages will be involved before a final decision to commit significant resources will be reached. In some cases the process may begin with no more than a one-line description of the idea⁴. If the idea is considered attractive, the next step is usually to gather more information (Figure 2). However, the criteria for electing the “right” idea for highly novel projects are just emerging. The criteria may vary: financial methods, risk assessment, diversification strategy etc.

⁴ Koen, P. et al. (2002) Fuzzy Front End: Effective Methods, Tools, and Techniques. In: Belliveau, P. et al. ed. The PDMA Toolbook for New Product Development. New York, John Wiley & Sons

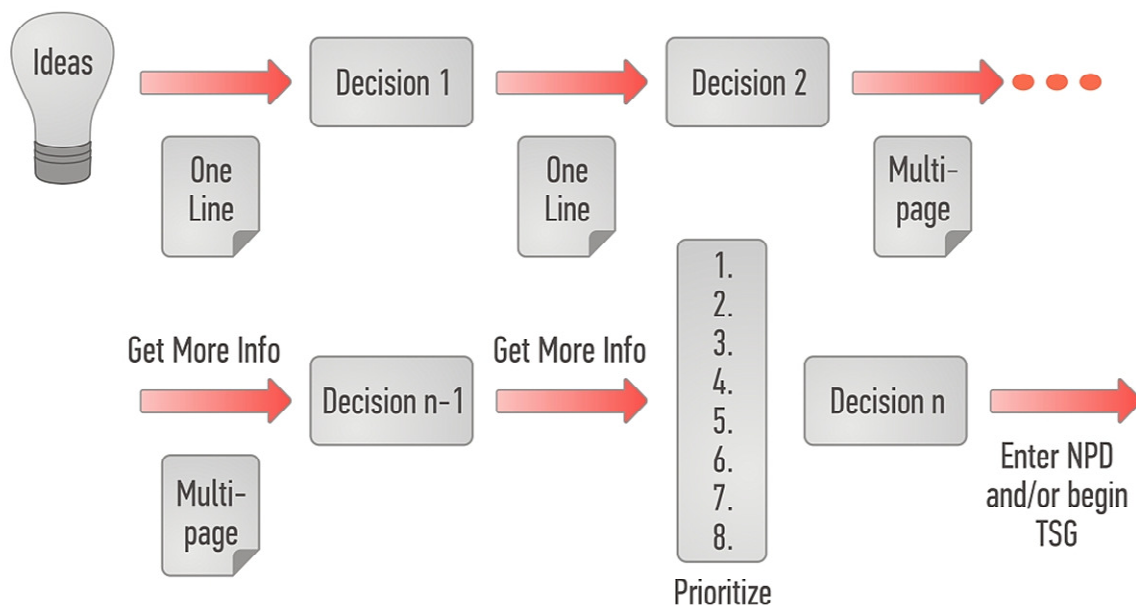


Figure 2: Idea Selection

(Koen, P. et al. (2002) Fuzzy Front End: Effective Methods, Tools, and Techniques. In: Belliveau, P. et al. ed. The PDMA Toolbook for New Product Development. New York, John Wiley & Sons.)

Task 1.4: Select one new product or service idea and discuss how you would record this idea in a formal company process, consider what information your company would need. Write down the reasons why it would be useful to record ideas in a formal process rather than through discussions. Design an idea recording sheet and process for your company based on p14 table (30 minutes)

The following reasons are why it is desirable to implement an idea disclosure process in a formal manner. These are not complete, and the method of recording can be very different for each company:

1. It motivates staff to record ideas because action is taken to assess them
2. A reward scheme could be based on reported idea disclosures for staff, for example 'best new product idea'
3. By recording ideas it prevents the company 'reinventing the wheel', that is doing the same research and development because no one remembers the same idea had been discussed ten years before.
4. It can act as a date of invention, something which is important if a patent is sought in the USA, where one year grace period from date of invention is permitted before patenting.
5. The form provides tangible evidence of Intellectual Property generation from which rights can be traced, i.e. date of copyright, design or invention.

6. The information provided is consistent for each idea, which makes assessing commercial potential much easier, and allows for decision making when many ideas are disclosed.
7. It provides the first step in keeping an audit trail from idea generation through to product launch.

In selecting the criteria for screening a scoring system is often used as this can give a quantitative analysis which is then used to select the best projects. For example the number of criteria can range from 5 for small companies to 100's for large organizations which operate in the global economy. As an example, the small technology start-up company called Exilica Limited, in the United Kingdom, operates a 10 point commercial opportunity appraisal process which scores each of 10 criteria from 1 to 10, where 1 is low and 10 high. The resulting score will be out of 100 as a maximum. The scoring criteria are shown below, and each one is given a weighting factor of 1.

1. Uniqueness of the technology, idea or concept
2. Readiness of the technology, idea or concept
3. Value of the Market
4. Anticipated Profit Margins
5. Intensity of Competition in the market
6. Competitive edge of your product or service
7. Ease of access to the market
8. Customer conservatism
9. Funding of the project
10. Ability and gaps in the NPD team

It is more common to allocate a weighting factor to each criteria for scoring. This process allocates a weighting factor to indicate how important to the company each criteria is. For example if "anticipated profit margins" is 5 times more important than the rest the resulting score for this would be multiplied by 5.

See <http://www.pd-trak.com/> for details on a commercial package with scoring and weighting factors.

How will this affect your choice of projects?

As an example the screening process has shown the relative scores for each of the following project ideas, if your company can only pursue one idea then project E would be chosen (see Table 1). One reason that a consistent process is used is to prevent senior employees always getting their personal ideas carried forward, at the expense of better ideas from more junior staff, this is termed 'leveling the playing field' which actually means *to give everyone the same advantages or opportunities*. Screening of ideas is usually undertaken by an experienced team within a company to include staff with expertise in R&D, sales, marketing, operations, manufacturing and production in order to get an unbiased score. If scores are level at the end of an assessment exercise then weighting of certain factors can be used to discriminate and select the best possible project.

Criteria	Project A	Project B	Project C	Project D	Project E	Project F	Project G
Uniqueness of the technology, idea or concept	7	6	9	2	9	3	5
Readiness of the technology, idea or concept	3	4	5	4	7	6	6
Value of the Market	5	3	6	2	8	4	9
Anticipated Profit Margins	6	3	6	7	8	3	4
Intensity of Competition in the market	8	9	3	7	9	6	6
Ease of access to the market	2	7	5	9	7	5	6
Customer conservatism	5	6	2	5	6	5	1
Funding of the project	3	7	5	6	9	7	3
Ability and gaps in the NPD team	4	5	5	4	6	7	7
Total Score	43	50	46	46	69	46	47

Table 1: screening process matrix

1.3 Concept and development testing

Once the firm decides that a new product idea meet enough criteria to represent an attractive opportunity, then it will invest in development. Here, the R&D Department begins with technical specification and produces a prototype. Of course not all companies have a separate R&D department so depending on the size and structure of the firm, the process is adapted accordingly All the marketing and engineering details are specified while intellectual property issues are carefully investigated. The basic questions that need to be answered at this stage are the following:

- Investigate intellectual property issues and search patent data bases
- Who is the target market and who is the decision maker in the purchasing process?
- What product features must the product incorporate?
- What benefits will the product provide?
- How will consumers react to the product?
- How will the product be produced most cost effectively?
- Prove feasibility through virtual computer aided rendering, and rapid prototyping
- What will it cost to produce it?

If this product involves innovative technology, then typically the Research team (or the individuals who are in charge of research) will be responsible for concept design. Research would be responsible for handing the Development/Engineering team a "developable" concept design. If the product is an extension of existing technology, then typically it moves right to the Development/Engineering team. Research or Development/Engineering will brainstorm possible designs and create mock-ups of this design if needed and budgeted. They may work with purchasing to gather preliminary vendor costs. The output of this stage is a conceptual design (which can be a drawing, 3-D model, service or software demo), estimated cost, design timeline and test data if appropriate⁵.

The testing requires formal evaluations of the product concept by consumers, usually through some form of marketing research. New product ideas with low concept test scores are discarded or revised. Usually, the produces/services/concepts are introduced to a representative sample of the population to assess the market's reaction. Concept testing uses both quantitative methods and qualitative methods to evaluate consumer response to a product idea prior to the introduction of a product to the market. Some methods to perform testing are by using field surveys, personal interviews and focus groups, in combination with various quantitative methods, to generate and evaluate product concepts⁶.

The quantitative portions of concept testing procedures have generally been placed in three categories:

⁵ Mitch Millstein, (2010), Lean Product Development Process - Using Stage-Gates to Speed the Development Cycle

⁶ Moore, William L. (1982). Concept Testing. Journal of Business Research 10, 279-294

- concept evaluations, where concepts representing product ideas are presented to consumers in verbal or visual form and then quantitatively evaluated by consumers by indicating degrees of purchase intent, likelihood of trial, etc.,
- positioning, which is concept evaluation wherein concepts positioned in the same functional product class are evaluated together, and
- product/concept tests, where consumers first evaluate a concept, then the corresponding product, and the results are compared

Task.1.7 Access the following website and read how the Kano method is used to obtain evidence of customer orientated features in new products and services. Then evaluate how would you use the Kano method in your company based on the main principles of client preferences:

- Attractive
- One-Dimensional
- Must-Be
- Indifferent
- Reverse

http://en.wikipedia.org/wiki/Kano_model

1.4 Business Analysis

This is the stage of the new product development process where a new product idea surviving the screening stage is subjected to a more sophisticated and detailed analysis. Because new product development costs accelerate sharply thereafter, it is imperative to eliminate inappropriate ideas at this stage. Usually, sales potentials are forecast, cost estimates are made, break-even points are calculated, and in some cases more comprehensive decision procedures are used.

Part of this phase is the development of sales forecast and revenue and cost projections. Projections must also include an estimate of the number of units to be sold over specified material costs, production costs and marketing expenses associated with bringing the product to market. (Figure 3)



Figure 3: Factors considered in the Business Analysis Phase

Task 1.9 If all the above criteria are positive for a project of your choice that has the following characteristics:

High demand

Low cost to manufacture

Very little serious competition

Return on investment at 500% within 2 years

Consider what factors might stop a project of this kind now progressing .(45 minutes)

1.5 Beta and Market Testing

The activities involved in this stage are the following:

- Produce a physical prototype or mock-up
- Develop the packaging
- Test the product in typical usage situations
- Conduct focus group customer interviews or introduce at trade show
- Make adjustments where necessary
- Produce an initial run of the product and sell it in a test market area to determine customer acceptance

The market test will be performed by placing the products for sale in one or more selected areas and observe its performance. The purpose for undertaking the abovementioned activities is to evaluate the product and pretest the marketing efforts prior to a full launch. In this way, actual customer behavior can be observed. The company can also learn about competitive reactions (towards other products) and the effectiveness of the distribution channel.

There are different market testing methods depending on the product/service: Business to Consumer (B2C) or Business to Business (B2B). The main methods for consumer products are⁷:

- Simulated test marketing: a representative number of potential customers are tracked down and are invited to participate in the test. The main elements to be investigated are: customer's buying behavior, reactions to advertisements of competitive products, and final choices. The qualitative discussion on the final choice that will follow is anticipated to reveal the reasons for selecting or not the product.
- Consumer panels: a number of potential users try the product and they are asked to express their opinion and intention to buy.
- Test Marketing: For this testing the most representative, in terms of population of the country cities, are selected. The product is placed on sale points and the company monitors the sales figures.

According to Kotler, 2003, the main methods for industrial (B2B) products are⁸:

- The product is tested in limited geographical area. The sales person makes an actual sale as part of the regular sales call
- The product is tested in distributor and dealer display rooms. This reflects the products normal selling situation
- The product is tested in a trade show. This gives the opportunity to test it to a large number of buyers
- The product is tested through speculative sale.

Task 1.10: The Marketing Director for your company has asked for a consumer usability trial to be secretly filmed. Please write approximately 200 words describing the benefits from this exercise

1.6 Technical Implementation

This chapter will offer to students a thorough understanding of the planning before the final launch which includes defining the specificities of the logistics, resources, contingency plans, supplier management and setting quality management standards and systems.

This stage includes the remaining steps required for full general release of the product

- Increase in volume production, marketing and launch plan implementation, distribution and support are important elements.

⁷ George Avlonitis, Paulina Papastathopoulou, (2006) Product and Services Management, Sage

⁸ P Kotler, (2003), Marketing Management: Analysis, Planning, Implementation and Control, 11th edition, Prentice Hall

- Make necessary adjustments to ensure product is ready for launch.
- A post launch review should take place at least three to six months following the initial release of the product. In the post launch review, the overall product performance should be accessed as well as the level of customer acceptance/satisfaction with the product. Significant product issues should be covered as well as potential product enhancements.
- Lastly, there should be a review of the process in general, and any recommendations for corrective actions.

The establishment and finalization of the quality management system is an absolutely important part of this process and will contribute to the successful implementation of the new product.



Figure 4: Elements of a Quality Management System

A detailed plan needs to be established containing the following information:

- Resource estimation: both in terms of human resources as well as financial
- Technical communication: research and create information about technical processes or products directed to an audience through media.
- Department scheduling/Gantt Chart
- List of suppliers and logs
- Logistics planning
- Monitoring mechanism and timings
- Contingency plans (What-if scenario planning)

Task 1.11: (20 minutes)

List as many scenario planning issues as you can which are associated with:

1. A supply chain
2. Legal and Environmental
3. Product Quality

Follow the link for further information and examples:

<http://www.jiscinfonet.ac.uk/tools/scenario-planning>

1.7 Commercialization

The commercialization stage involves implementing a total marketing plan and full production. The company which launches the new product must first decide on introduction timing. This means the right timing for introducing the project in the market. An important part of this process is the development of advertisements and promotions.

Example: If DaimlerChrysler's new fuel-cell electric car will eat into the sales of the company's other cars, its introduction may be delayed. If the car can be improved further, or if the economy is down, the company may wait until the following year to launch it.

Next, the company must decide *where* to launch the new product—in a single location, a region, the national market, or the international market. Few companies have the confidence, capital, and capacity to launch new products into full national or international distribution. They will develop a planned *market rollout* over time. In particular, small companies may enter attractive cities or regions one at a time. Larger companies, however, may quickly introduce new models into several regions or into the full national market.

Companies with international distribution systems may introduce new products through global launch. A critical path analysis is advisable to be used at this stage so as to ensure that the activities will be implemented on time and according to the plan. The critical path method (CPM) is an algorithm for scheduling a set of project activities.⁹ It is an important tool for effective project management. The essential technique for using CPM is to construct a model of the project that includes the following¹⁰:

- A list of all activities required to complete the project (typically categorized within a work breakdown structure),
- The time (duration) that each activity will take to completion, and
- The dependencies between the activities

⁹ Kelley, James, (1961) *Critical Path Planning and Scheduling: Mathematical Basis*. Operations Research, Vol. 9, No. 3, May-June.

¹⁰ Samuel L. Baker, Ph.D. "Critical Path Method (CPM)" University of South Carolina, Health Services Policy and Management Courses

Using these values, CPM calculates the longest path of planned activities to the end of the project, and the earliest and latest that each activity can start and finish without making the project longer. This process determines which activities are "critical" (i.e., on the longest path) and which have "total float" (i.e., can be delayed without making the project longer). In [project management](#), a critical path is the sequence of [project network](#) activities which add up to the longest overall [duration](#). This determines the shortest time possible to complete the project. Any delay of an activity on the critical path directly impacts the planned project completion date (i.e. there is no [float](#) on the critical path). A project can have several, parallel, near critical paths. An additional parallel path through the network with the total durations shorter than the critical path is called a sub-critical or non-critical path. These results allow managers to prioritize activities for the effective management of project completion, and to shorten the planned critical path of a project by pruning critical path activities, by "fast tracking" (i.e., performing more activities in parallel), and/or by "crashing the critical path" (i.e., shortening the durations of critical path activities by adding resources).

<http://www.ehow.com> [basic tools and techniques of CPD]

Task 1.12 Consider your own example of a new idea for a project or service:

Work through the seven stages of NPD to see how the new product/service could be launched in the European marketplace. (1000 words)

2 New Product Development methods

Formal processes are usually applied to direct the development process from ideas to launch. This chapter will focus on the principles and methodologies of product development in a realistic context. Most product development professionals work under tremendous time pressure and do not have an opportunity to reflect on the development process. **This chapter's objective is to familiarize students with the two most common methods used:**

- Six sigma method
- Stage-Gate model

2.1 Six Sigma

Six Sigma is a business management strategy originally developed by Motorola, USA in 1986.¹¹ As of 2011, it is widely used in many sectors of industry, although its use is not without controversy.

Introduction to Six Sigma

Six Sigma seeks to improve the quality of process outputs by identifying and removing the causes of defects (errors) and minimizing variability in manufacturing and business processes.¹² It uses a set of quality management methods, including statistical methods, and creates a special infrastructure of people within the organization ("Black Belts", "Green Belts", etc.) who are experts in these methods. Each Six Sigma project carried out within an organization follows a defined sequence of steps and has quantified financial targets (cost reduction or profit increase).

http://en.wikipedia.org/wiki/List_of_Six_Sigma_companies

They are two main Six Sigma Methods:

A. DMAIC project methodology:

The DMAIC (Define-Measure-Analyze-Improve-Control) methodology is used for those projects that are targeted to improve the existing business processes. The type of Six Sigma methodology work on the following main steps¹³:

- Define: The Define phase of DMAIC Six Sigma methodology includes: finding the project goals and sub-goals, establishing an infrastructure to meet these goals and project planning to improve functioning.
- Measure: This phase includes relevant data collection, preparation of various metrics based on the available data etc. It basically involves measurement of important aspects of the current process etc.
- Analyze: In this phase of DMAIC Six Sigma methodology, defects are analyzed to establish the 'Cause & Effect' relationships. This step ensures that all factors are considered and determines the root cause of defects in the process.
- Improve: This phase makes use of data, metrics and analysis done in the above phases. The processes are improved by using better techniques that eliminates the root causes of defects.
- Control: This phase includes continuous control and monitoring of process improvement process to assure future products and services with zero defects.

¹¹ Tennant, Geoff (2001). SIX SIGMA: SPC and TQM in Manufacturing and Services. Gower Publishing, Ltd.. p. 6.

¹² Jiju Antony (2008), Pros and cons of Six Sigma: an academic perspective

¹³ Six Sigma team (2010) Understanding The Six Sigma Methodology

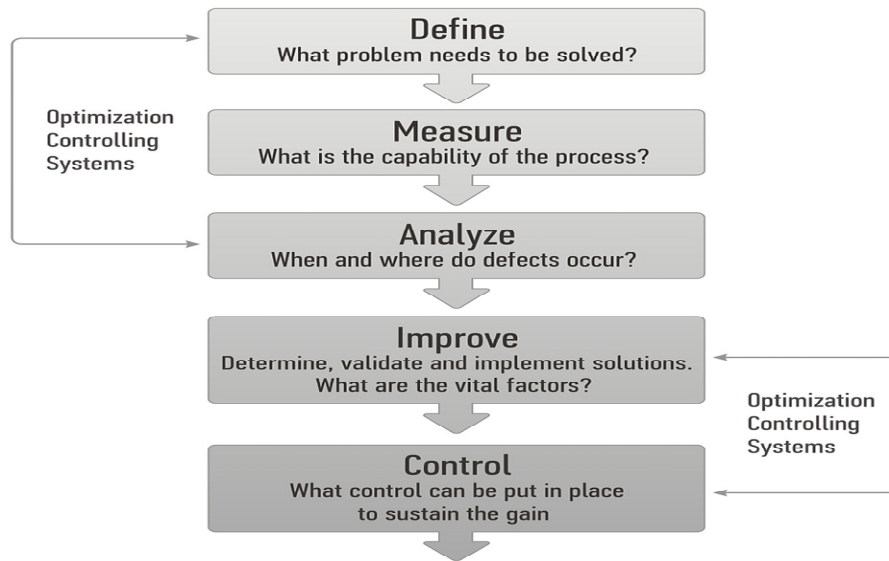


Figure 5: DMAIC steps

B. DMADV or DFSS methodology

Design for Six Sigma is a systematic approach to drastically improve the designed product in terms of its customer value, quality, reliability and cost.¹⁴ Design for Six Sigma (DFSS) is a separate and emerging business-process management methodology related to traditional Six Sigma. While the tools and order used in Six Sigma require a process to be in place and functioning, DFSS has the objective of determining the needs of customers and the business, and driving those needs into the product solution so created. DFSS is relevant to the complex system/product synthesis phase, especially in the context of unprecedented system development. It is process generation in contrast with process improvement.

The project methodology features five phases¹⁵:

Define design goals that are consistent with customer demands and the enterprise strategy.

Measure and identify CTQs (characteristics that are Critical To Quality), product capabilities, production process capability, and risks.

Analyze to develop and design alternatives, create a high-level design and evaluate design capability to select the best design.

Design details, optimize the design, and plan for design verification. This phase may require simulations.

Verify the design, set up pilot runs, implement the production process and hand it over to the process owner(s).

¹⁴ Kai Yang, Basem S. El-Haik, Basem El-Haik (2009), Design for Six Sigma: A Roadmap for Product Development, McGraw-Hill Professional,

¹⁵ De Feo, Joseph A.; Barnard, William (2005). *JURAN Institute's Six Sigma Breakthrough and Beyond - Quality Performance Breakthrough Methods*. Tata McGraw-Hill Publishing Company Limited

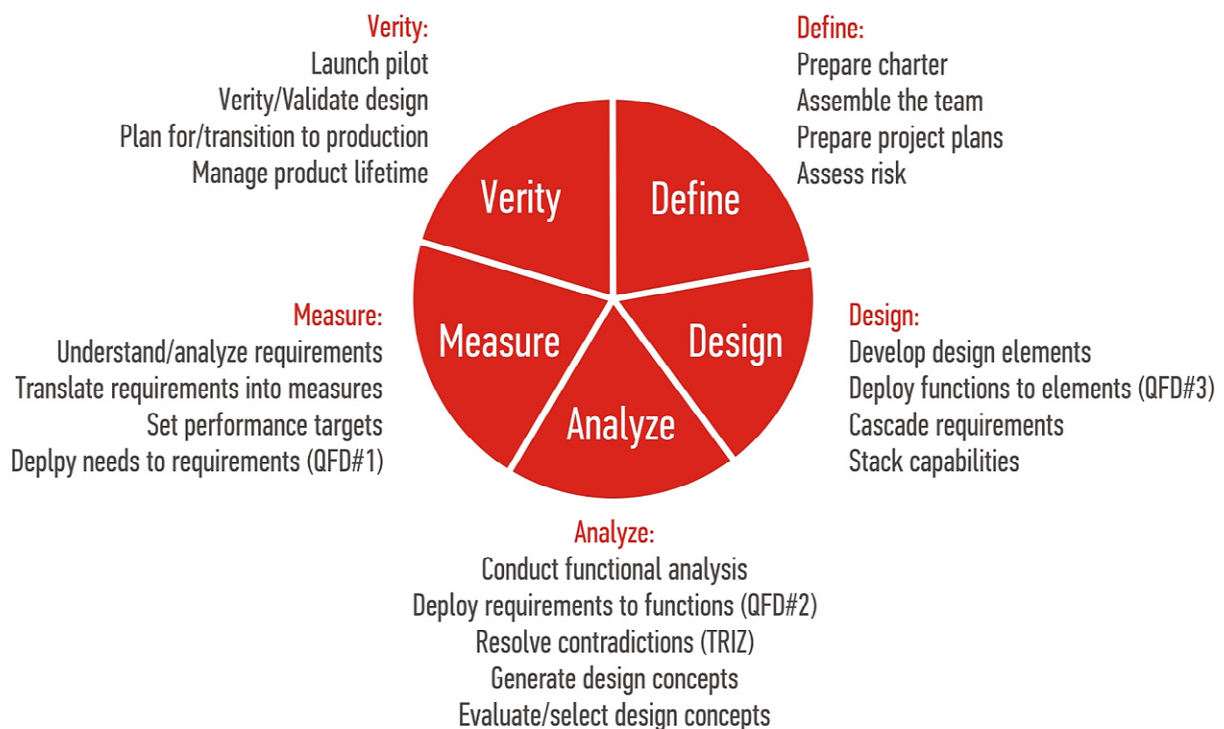


Figure 6: DFSS Model

(source: <http://www.statamatrix.com/sixsigmadmadv/sixsigmadmadvconsulting.php>)

Task 2.1: Use the DFSS model described above to plan for the release of a new product or service. Write a small paragraph introducing few suggesting for every phase (30 minutes)

2.2 Stage-Gate® model

A Stage-Gate® model is a conceptual and operational road map for moving a new-product project from idea to launch. Stage-gate® model divides the effort into distinct stages separated by management decision gates (gatekeeping). Cross-functional teams must successfully complete a prescribed set of related cross-functional activities in each stage prior to obtaining management approval to proceed to the next stage of product development. This Chapter will introduce students to the stage-gate® model and enable them use the model as a framework for new product development.

The Stage-Gate® model, originally designed by Dr. Robert G. Cooper, is an extremely useful and powerful tool in product development. It splits progress into a series of “Stages” and “Gates” to give a well organized and structured flow to the project:

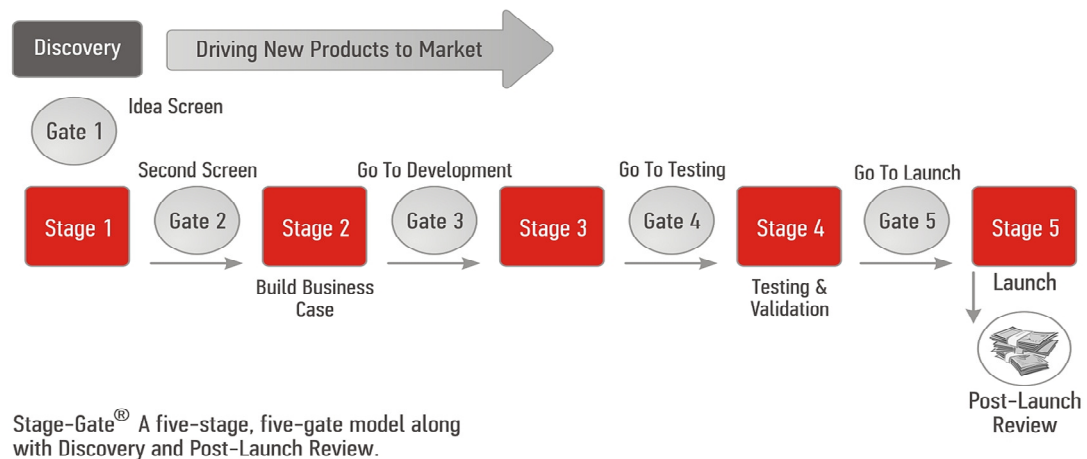


Figure 7: The Stage-Gate Model

(source: Dr. Robert G. Cooper, Dr. Scott J. Edgett, Dr. Elko J. Kleinschmidt (2002), Optimizing the Stage-Gate® Process : What Best Practice Companies are Doing -Part One, Research and Technology Management, volume 45, No5)

The Stages

The stage-gate® model is a conceptual and operational road map for moving a new project from idea to launch - a blueprint for managing the new-product process to improve effectiveness and efficiency. The traditional stage-gate® process has five stages and five gates. An extra stage has been added to that in order to highlight the importance of idea generation¹⁶:

Stage 0 - Discovery: Activities designed to discover opportunities and to generate new product ideas.

Stage 1 - Scoping: A quick and inexpensive assessment of the technical merits of the project and its market prospects.

Stage 2 - Build Business Case: This is the critical homework stage - the one that makes or breaks the project. Technical, marketing and business feasibility are assessed resulting in a business case which has three main components: product and project definition; project justification; and project plan.

Stage 3 - Development: Plans are translated into concrete deliverables. The actual design and development of the new product occurs, the manufacturing or operations plan is mapped out, the marketing launch and operating plans are developed, and the test plans for the next stage are defined.

Stage 4 - Testing and Validation: The purpose of this stage is to provide validation of the entire project: the product itself, the production/manufacturing process, customer acceptance, and the economics of the project.

Stage 5 - Launch: Full commercialization of the product - the beginning of full production and commercial launch.

¹⁶ Cooper, Robert G. (1993). Winning at New Products: Accelerating the Process from Idea to Launch. 2nd Ed., Cambridge, Mass: Addison-Wesley

The Gates

Gates provide various points during the process where an assessment of the quality of an idea is undertaken and decisions made about further development. They are evaluations of progress so far, and feasibility of the project. They determine whether the project should continue based on its deliverables. Each stage includes a specified set of deliverables so as the evaluation to take place as quickly and as efficient as possible.

The structure of each gate is similar:

Deliverables: Inputs into the gate review - what the project leader and team deliver to the meeting. These are defined in advance and are the results of actions from the preceding stage. A standard menu of deliverables is specified for each gate.

Criteria: What the project is judged against in order to make the go/kill and prioritization decisions. These criteria are usually organized into a scorecard and include both financial and qualitative criteria.

Outputs: Results of the gate review. Gates must have clearly articulated outputs including: a decision (go/kill/hold/recycle) and a path forward (approved project plan, date and deliverables for the next gate agreed upon).

Task 2.2 Stage-gate® process has been criticised recently as being 'too rigid' and not flexible enough to respond quickly to changes in the project between gate meetings. How would you design a modified stage-gate® process which can respond to changes between gates and still maintain the advantages of the original NPD process? Give 3 examples of changes that can be introduced so as to maximize the potential/ improve of the stage-gate® process (15 minutes)

Task 2.3 Use the following 2 models to write a development proposal to the management of your company to bring a new product or service to market.

The 5 phases of the DFSS Model

The 5 stages of the Stage-Gate Model

(maximum length 1000 words)

3 Innovation commercialization: introducing new products and services to the market

Commercialization is the [process](#) of introducing a new [product](#) into the [market](#). The actual launch of a new product is the final stage of [new product development](#), and the one where the most [money](#) will have to be spent for [advertising](#), [sales promotion](#), and other [marketing](#) efforts. **This Chapter will equip students with the necessary knowledge on how to make a successful launch and introduce them to commercialization techniques so as to enable them take informed decisions on which method to use.**

3.1 Commercialization Techniques

There are two basic ways to commercialize a new product: either through licensing to someone else to sell or internally in your own venture.

A. Licensing

Licensing means to grant to another person or company the rights to an intellectual property. More information about the intellectual property types will be taught in module 4. This idea appeals to many inventors because the amount of money as well as the amount of tasks, skills, and people required seems considerably less than what it would take for the client to set up a new business.

Disadvantages of the technique:

The inventor will lose control of the technology.

The inventor's involvement is reduced. In most cases, the inventor will have no further direct involvement at all.

Finding the right licensee is tough.

Protecting the inventor's interest is crucial

Advantages of the technique:

Licensing multiplies the resources to develop the invention. If the licensee is a dynamic firm, it can immediately put whole teams of professionals to work developing, producing and marketing the product to sell ideas to a lot of companies-the competition is fierce and companies

Simpler, less expensive and allows inventors to spend more time inventing. "Licensing or assigning rights to your invention for cash is a simpler, less-expensive route than manufacturing and selling your invention. Licensing or assigning your invention is often preferable for those inventors who want to make money but care primarily about innovating and spending time in their lab."¹⁷

By licensing their invention, inventors don't have to invest capital from the beginning. Many inventors try to obtain licensing agreements since they don't have to invest initial capital to get their ideas to market. Also licensing can occur at a later stage, only on the part of the promotion

B. Venturing

Disadvantages of the technique:

1 ¹⁷ [Jack R Lander](#) (2000), The six point master plan for converting your ideas into profit

Higher risk. "Compared to licensing, manufacturing is definitely a more high-risk proposition, but it can be very successful if done correctly."¹⁸

Licensing companies will market your product but manufacturing companies will only manufacture it. "While a licensing company will also market your product, a manufacturing company does not"¹⁹

The inventor probably won't make much money for quite awhile. For the first stages of a new venture, it is more likely a business will be taking money from the inventor, rather than giving it in the form of salaries or profits.

Advantages of the technique:

Manufacturing an invention can produce much higher money returns than licensing.

Higher control over production, management and sales

Task 3.1: Licensing of products and services means that the owner of the Intellectual Property, say a patented product, will get a percentage of sales from the Licensee. This percentage varies from product to product and covers a range of values. From searching the internet find the average royalty rate range, as a percentage, that a company might expect for a patented pharmaceutical drug which has been approved for market release. Please develop your answer in no more than 200 words

3.2 Launch Strategy

The launch plan is a set of strategies that will be followed to a successful launch. This chapter will teach the students the main elements that a promotional plan consists of.

The main elements of a promotional plan are the following as derived from the Marketing Mix. Marketing Mix is a planned mix of the controllable elements of a product's marketing plan commonly termed as Ps (please see description below). The elements consisting the Marketing Mix are product, place and time, price, promotion, process, physical environment, people (figure 8).

Product: The core and periphery service elements at the centre of the company's marketing strategy. The scope of a product generally includes supporting elements such as warranties, guarantees, and support. The product aspects of marketing deal with the specifications of the actual goods or services, and how it relates to the end-user's needs and wants. Packaging the new product/service is also an element of this step.

Place and Time: Depending upon service product elements are delivered to customers physically and/or electronically, the important value adds to customers are speed and convenience, for example, point-of-sale placement or retailing. It is a channel by which a product or service is sold (e.g. online vs. retail), which geographic region or industry, to which segment (young adults, families, business people), etc. also referring to how the

¹⁸ Stephen Key, (2007), "Licensing vs. Manufacturing: What's Best for Your Product?," *AllBusiness*, Monday November 19

¹⁹ [Williams-Harold, Bevolyn](#), (1999) You've got it made! (developing invention ideas)," *Black Enterprise*,

environment in which the product is sold in can affect sales.

Price: Pricing is only a part of what customers may part with when purchasing a service or a product. This refers to the process of setting a price for a product, including discounts.

Promotion: The firm must make sure communications not only provide information, but also persuade the customer of the service's relevance to the customer's particular problem. This includes advertising, sales promotion, publicity, and personal selling

Process: This means the process by which the firm delivers product elements.

Physical Environment: the appearance of the place where the services are delivered may have a significant impact upon whether the service was satisfactory.

People: front-line staff for any company will have a direct impact on perceptions.



Figure 8: The Marketing Mix

(source:http://mantra4marketing.blogspot.com/2010_06_01_archive.html)

Task 3.2: From a visit to your local supermarket identify how many different types of product promotion you can find. Which ones work for you and why? Please develop your answer in 100-200 words.

Task 3.3: Using the entire Marketing Mix in Figure 8 analyse the strategy for launching a new product or service. (1000 words)

Self Assessment Test

1. NPD is the abbreviation for:
 - Net Profit Deducted
 - New Product Detriment
 - New Product Development
 - Never Properly Developed
 - Not Purposefully Deducted
2. One measure an investor looks at in funding a new product is RoI, which means return on investment, what is return on investment:
 - the cost of doing business
 - net profits before tax is deducted
 - the return on sales of the product as a percentage of investment
 - total loss to the owner
 - the return on an investment divided by the cost of the investment, expressed as a ratio or percentage
 - investment minus the profit divided by the return
3. The most costly part of the NPD process is:
 - idea generation
 - concept development
 - feasibility testing and R&D
 - prototype manufacture
 - production
 - post launch analysis
4. What does DAMIC mean
 - define, annotate, make, imitate, cancel
 - design, answer, manufacture, improve, complicate
 - defer, amalgamate, muddle, improvise, contort
 - design, analyze, measure, improve, control
 - design, analyze, make, implode, consummate
5. What does DFSS mean
 - define fluctuate submit senile
 - design for six sigma
 - design for sum substitution
 - definition foam super slim
 - don't forget supper son
6. The stage gate process is designed to:
 - cut projects which aren't going to make money

- allow decisions to be made on projects at different stages of development from idea to launch
 - let senior management get their projects approved
 - turn losses into profits by investment decisions
 - prevent good ideas getting to market
 - provide a systematic and well managed process so that a project meets customer and market needs
7. Kano's Voice of the Customer is a process which:
- cuts customers out of NPD
 - let's customers design their own products
 - provides customer feedback on product features
 - enables customers to cut projects they don't like
 - puts customers at the heart of the NPD process
 - turns customers into entrepreneurs through a Japanese style training programme
8. B2B and B2C are sales transactions which mean:
- business to business, business to conductor
 - business to bank, bank to consumer
 - bank to bank, bank to counterfeiter
 - business to business, business to customer
 - business to business, business to consumer
 - Brazil to Belgium, Belgium to China
9. Ten people are interviewed in the street and asked whether they would buy your new company's PDA product, which you showed them but more of the replies were negative. Do you:
- stop the project
 - go into full production
 - design a more representative customer focus group
 - check the results in the far east
 - take out any negative comments from your interviews
 - make up your own data to get the product into the marketplace
10. In the Marketing Mix there are 7 features all beginning with P. The first 6 are place, product, price, promotion, people, process. What's the missing P:
- pinnacle
 - physical exercise
 - physical evidence
 - physical exhaustion
 - price fixing
 - pumpkin
11. Identify which of these is a radical NPD

- the jet aircraft
 - adding another razor blade to improve a shave
 - the computer
 - the biro
 - designing a car which runs more efficiently
 - the mini skirt
 - the steam engine
 - the iPod Nano
12. What is the Critical Path Method [CPM]
- the analysis of ideas
 - a method to remove blockages in manufacturing
 - **an algorithm for scheduling a set of project activities**
 - getting a new product launched on time
 - developing a critical financial parameter for business
 - a method for cataloging car parts
13. What does SWOT stand for
- standard workers off target
 - same week offer trends
 - summation without order taking
 - some way off target
 - **strengths weaknesses opportunities threats**
 - strength work openness treats
14. In the Six Sigma process “Black Belts”, “Green Belts” etc are
- judo experts
 - karate experts
 - tai chi advisors
 - **specific business process experts**
 - advisors to the board of Directors
 - tailors who make the corporate uniforms
15. In a licence agreement what is a Royalty payment
- money paid to the King
 - money lost per transaction due to taxes
 - **money paid as a percentage of the sales price of goods or services**
 - **money paid at defined intervals to the licensor**
 - transfer of goods at member state boundaries
 - it has no meaning in any licence
16. What is a market rollout
- **introduction of a new product or service to the market**

- sellers in rolled steel joints
 - **a product release, often accompanied by a strong marketing campaign**
 - very cheap and low quality goods
 - a product failure
 - market stalls which can be easily erected
17. New product ideas can come from
- **chemists**
 - **receptionists**
 - **cleaners**
 - **physicists**
 - **market and sales force**
 - **operations managers**
 - only senior managers
18. What is meant by beta testing
- providing a recreational drug to party goers
 - solving a mathematical algorithm
 - **making a pre release software product available for selective testing**
 - a very hard law exam
 - **a method to gain feedback on software bugs before release**
 - testing a product for electrical safety
 - the stage following alpha testing
19. What is meant by the term innovation
- invention
 - solving a critical management problem
 - **getting a new product or process to market**
 - a European phenomenon
 - changing the staff in an organisation
 - **derives from the Latin word *innovatus*, which is the noun form of *innovare* "to renew or change"**
 - **substantial positive change as opposed to incremental change**
20. What is considered to be the most important factor for a company in getting a new product/service to market
- money to develop it internally
 - very clever science
 - intellectual property protection
 - new and novel packaging
 - **excellent staff**

- very high profit margins

Summary

This Module 3 dealt with the New Product Development and Implementation process, starting from the basic steps of the process: idea generation, idea screening, , market research and business analysis, concept development, listening and capturing customer requirements and needs, testing, technical implementation, commercialization, moving to various different methods for New Product Development. The two most famous methods were analysed: Cooper's Stage-Gate® process and Six Sigma in order to familiarize students with the most important methodological frameworks.

Last but not least, a number of commercialization techniques were presented. All the elements included in the commercialization method as well as the promotional channels were suggested for the successful launch of a new product/service.

Module 3 Final Assessment

Please provide a report of 2000 words summarizing the following:

- select one new product or service idea and describe. Design an idea recording sheet and process for your company based on p14 table
- for your idea list as many scenario planning issues as you can which are associated with: supply chain , Legal and Environmental , Product Quality
- Work through the seven stages of NPD to see how the new product/service could be launched in the European marketplace.
- Use the DFSS and stage-gate® models to bring a new product or service to market.
- Based on Marketing Mix describe the strategy for launching your product/service

Note that the report should be based on the answers given on tasks 1.4, 1.11, 1.12 , 2.3 and 3.3

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