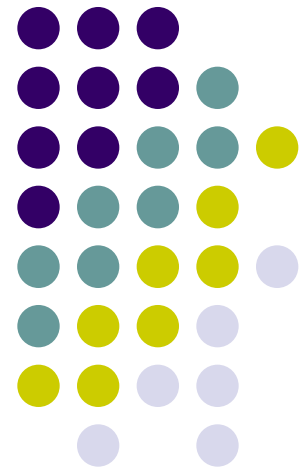


ME 482 – Rapid Product Development and Manufacturing

Chapter 2

Fundamentals of New Product Development (Part I)

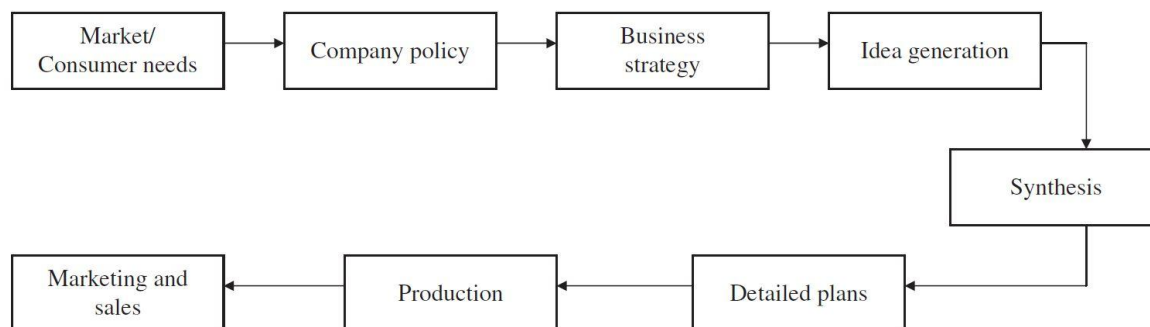


**Mechanical Engineering
University of Gaziantep**

Dr. Sadık Olguner



- Successful companies constantly operate in a state of innovation in terms of products they manufacture, **frequently introducing new products** or **modifying and improving existing products** as needed and desired by the customers.
- The overall process of conceptualizing a product and designing, producing, and selling it is known by a generalized and comprehensive process called **new product development**.
- Before a successful product can be developed, someone has to come up with **an idea** for conceptualizing it. There cannot be just one idea; **several promising ideas** need to be **developed** and **analyzed** before the detailed plans for a new business activity can be generated.



Attributes of successful product development



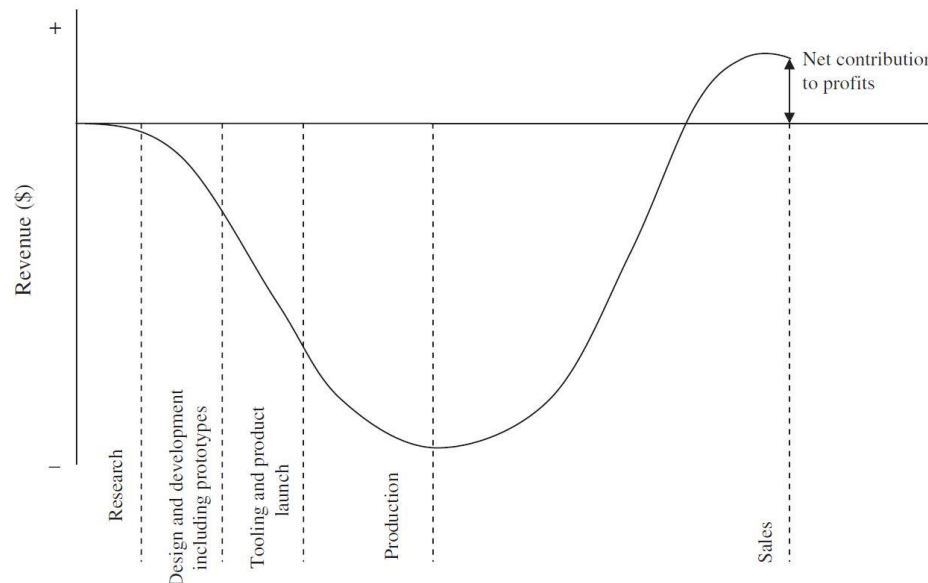
- A business should develop the **high quality products** the market desires **quickly, economically, easily, and efficiently**. That leads to the following attributes:

Cost: Both the cost of producing the product and the total cost of developing it. (*Fixed costs, variable costs*).

Quality: The quality of the product.

Product development time: From assessing needs to product sale.

Development of know-how: To repeat the process for future products.



Key factors to developing new products



- **Uniqueness:** Products that succeed in the marketplace are **unique** and **provide marginal benefits**. The winners:
 - Provide **excellent value** for the money
 - Have **excellent quality** in comparison to their competition
 - **Meet customers' needs** more fully than competing products
 - Have highly visible and perceived **useful benefits and features**.
- **Customer focus and market orientation:** Focus on customer wants is critical to the development of successful products. Such focus improves success rates and profitability. To achieve a strong market orientation, businesses must:
 - Develop a thorough understanding of the **nature of the market**.
 - **Understand the competition**, which can be local, regional, or global.
 - Devote resources to activities that determine **customers' wants**.
 - Develop a relationship between **product attributes** and **user needs**.
 - Seek customer input throughout the product design, development, prototyping, testing, and marketing (*e.g., Boeing in the development of its 777 and 787 aircraft*).



- **Sharp and early product definition:** Predevelopment work leads to a sharp and early product definition and is essential for **reducing the time to market**. A product definition includes:
 - An outline of the concept and the **benefits to be provided**
 - A list of product attributes and features (*ranked in the order “essential” to “desirable”*)
 - A description of potential users and attributes of the market (*size, demographics, etc.*)
 - An outline of the business strategy (*how the product will be placed vis-à-vis competitors*)
- **Execution of activities:** Product development teams that succeed consistently do a better job across the activities identified under market orientation. These teams do not skip **market studies** and do undertake **trial sales** (*using test markets to see how the products will fare*). There is no rush to market to capture that illusive share which maximizes profits.



- **Organizational structure and climate:** For product development teams to succeed, they must be **multifunctional** and **empowered**. This means that:
 - Teams comprise members from all basic functions: *research and development, engineering design, production, quality, sales and marketing, and so forth.*
 - Each member of the team represents the team and his or her “*function*” not the department and its “*territory*”
 - Teams devote most of their time to **project planning** and **product development**.
 - Team members share **excellent communication** and are in constant **contact with each other**.
 - The entire team is **accountable** for the entire project.
 - The team is led by **a strong and motivating leader**.
 - Company management strongly **supports the project, the team, and the team leader**.

Key factors to developing new products



- **Project selection decisions:** Many companies are involved in too many projects at one time, scattering valuable resources among many candidate projects. However, not all projects are likely to materialize. This requires making tough “go” and “no-go” decisions. Superiority of the product in comparison to **competitors’ products**, **product attributes that meet consumers’ needs**, and **market attractiveness** are some of the factors that need to be considered in making selection decisions.
- **Telling the world you have a good product:** Having a good product is not enough; it must be promoted properly in the marketplace. New products must be launched at appropriate forums and adequate resources must be allocated to market them. The launch and marketing efforts must be supported by a professional staff (ideally, if the product is designed properly and has high quality built in, this would not be an issue). It would be foolhardy to assume that **a good product will sell itself by word of mouth**. *The launching of the iPhone and iPad by Apple is a case in point.*

Key factors to developing new products



- **Availability of a systematic new product process:** This process formalizes the new product development process, from concept development to launch, by dividing it into logical steps with strict go and kill decision criteria. These criteria are established by the project team and generally are listed in terms of deliverables for each stage. These criteria serve as the quality control checkpoints (*that results in many advantages, including improved teamwork, early detection of failure, higher success rate, better launch of the product, and a shorter time to market*)
- **Market attractiveness:** The market for launching the new product should be **attractive**; however, **this is easier said than done**. Nevertheless, some market attributes can help identify an attractive market. (*Market growing rate, economical climate etc.*)

Key factors to developing new products



- In summary, successful consumer products have the following attributes:
 - They offer entirely **new benefits that existing products do not**.
 - They offer **a new secondary benefit** in addition to the new primary benefit.
 - They are **comparable to what the competition offers**.
 - They **eliminate an important negative in existing market products**.
 - They offer **a higher quality features** than available in the market.
 - They harness contemporary societal trends.
 - They offer **a price advantage** in comparison to the competition.



- Before a development plan can be put together, certain activities must be performed in order **to develop an overall new product development strategy**. These activities include:
 - Determining the **company's growth expectations** from the new products
 - Gathering information of interest regarding capabilities, market, and the customers
 - Determining what opportunities exist
 - Developing **a list of what new product options exist**
 - Setting criteria for inclusion of new products in the company's portfolio of products
 - Creating the **product portfolio** (new, modified, and existing)
 - Managing the product portfolio to maximize profitability
 - **Developing new product plans** (*understanding consumers and their needs, understanding the market, product attributes and specifications, schedules, resources, financials, and documentation*)



► Determining existing opportunities (*Matrix scoring model*)

		Product concept scores		
Criteria	Weight (w)	A	B	C
Financial	3	$3 \times 3 = 9$	$2 \times 3 = 6$	$2 \times 3 = 6$
Customer needs	4	$8 \times 4 = 32$	$5 \times 4 = 20$	$7 \times 4 = 28$
Production ease	2	$4 \times 2 = 8$	$3 \times 2 = 6$	$5 \times 2 = 10$
Core competency	2	$3 \times 2 = 6$	$4 \times 2 = 8$	$8 \times 2 = 16$
Total score		55	40	60



➤ Customer needs statement for rechargeable electric toothbrush:

Small, compact, good fit in hand, nonslip grip
Attractive modern styling
Easy to charge; charge should last at least 7 days
Solid base; to double as charger
Both 110 and 220V operation
Brushing head to have rotational and reciprocating movement
Interchangeable and variable size cleaning heads
Price to be <\$100
Attractive colors and packaging
Brand name

Developing new product plans (Case study)



➤ Product specification for **rechargeable electric toothbrush**:

Performance
Effective cleaning effects; 2-min cleaning cycle time Long-lasting battery life (rechargeable); at least 30 min
Features
Capability to reach different areas with ease Small, lightweight design; no more than 1.3 ounce Ergonomic grip, comfortable; 1.5-in. circumference Exceeds the American Dental Association requirements for storage and replacement Timer Waterproof assembly
Reliability
Effective cleaning each use Cleaning head to last 12 weeks
Durability: All components to last 2 years under normal usage
Serviceability
Easy to replace head design Easy to replace floss design
Esthetics: New ergonomic styling concept
Packaging
Small and compact box packaging Lightweight package design and packing material; no more than 1 lb Attractive labeling and graphics RFID (radio frequency identifier) for added security and easy inventory tracking
Cost
Manufactured cost <\$80 Service and warranty cost <\$15

Developing new product plans (Case study)



➤ Product plan for rechargeable electric toothbrush:

Customer needs Small, compact, attractive styling Easy to use Easy to clean Price <\$100
Key product attributes Rotating and reciprocating head design Overall weight <1.3 ounce Overall length no more than 8 in. Polymer-based ergonomic contoured handle Soft bristles, pressure sensor limiting force 1.5 newtons Dual head: front, brushing; rear, tongue cleaning Rechargeable battery with 1-h life cycle LCD screen for charge display, brushing cycle time, sanitization status Quiet (<60 dBA)
Product financials Development costs, \$1,781,000 Tooling and capital, \$3,500,000 Manufacturing cost, \$70.70 Distribution and administration costs, 15% Margin for profit, 20%

Market and competition	
Gain >25% of market share Penetrate all leading retail chains	
Development schedule	
<i>Phase</i>	<i>Completion</i>
1. Customer needs	February
2. Product concept	May
3. Product design	August
4. Prototype development	September
5. Manufacturing	October
6. Product release	December
Resource requirements	
<i>Weeks</i>	<i>Phase</i>
6	Marketing and product management
24	Design engineering
12	Computer-aided design
16	Manufacturing engineering
10	Quality and test engineering
Key interfaces	
Marketing Research and development	