

CHAPTER 1: THE PROCESS OF FOOD PRODUCT DEVELOPMENT

METHODS OF FOOD PRODUCT DEVELOPMENT: AN
INSTRUCTIONAL GUIDE

WHY GO INTO FPD?

- **Financial reasons: increase profitability, gain new customers (including geographic expansion)**
- **Market driven: responding to today's consumers, increase market share**
- **Technological reasons: advances in ingredients and technologies**
- **Regulatory reasons: changes in laws/labeling, agricultural policies**



INTRODUCTION

The average time spent on developing new food products is about 2 years

- Time spent on FPD ranges from 6 months to 5 years
- Line extensions take less time to develop than products needing new processing line

Approximately 12,000-15,000 new food products are introduced into the market each year

90% -95% failure rate (product not on shelves after 5 years) in some grocery categories



PRODUCT DEVELOPMENT TEAMS

Large companies:

- Food scientists
- Food engineers
- Regulatory specialists
- Marketing experts
- Purchasing department



Small companies:

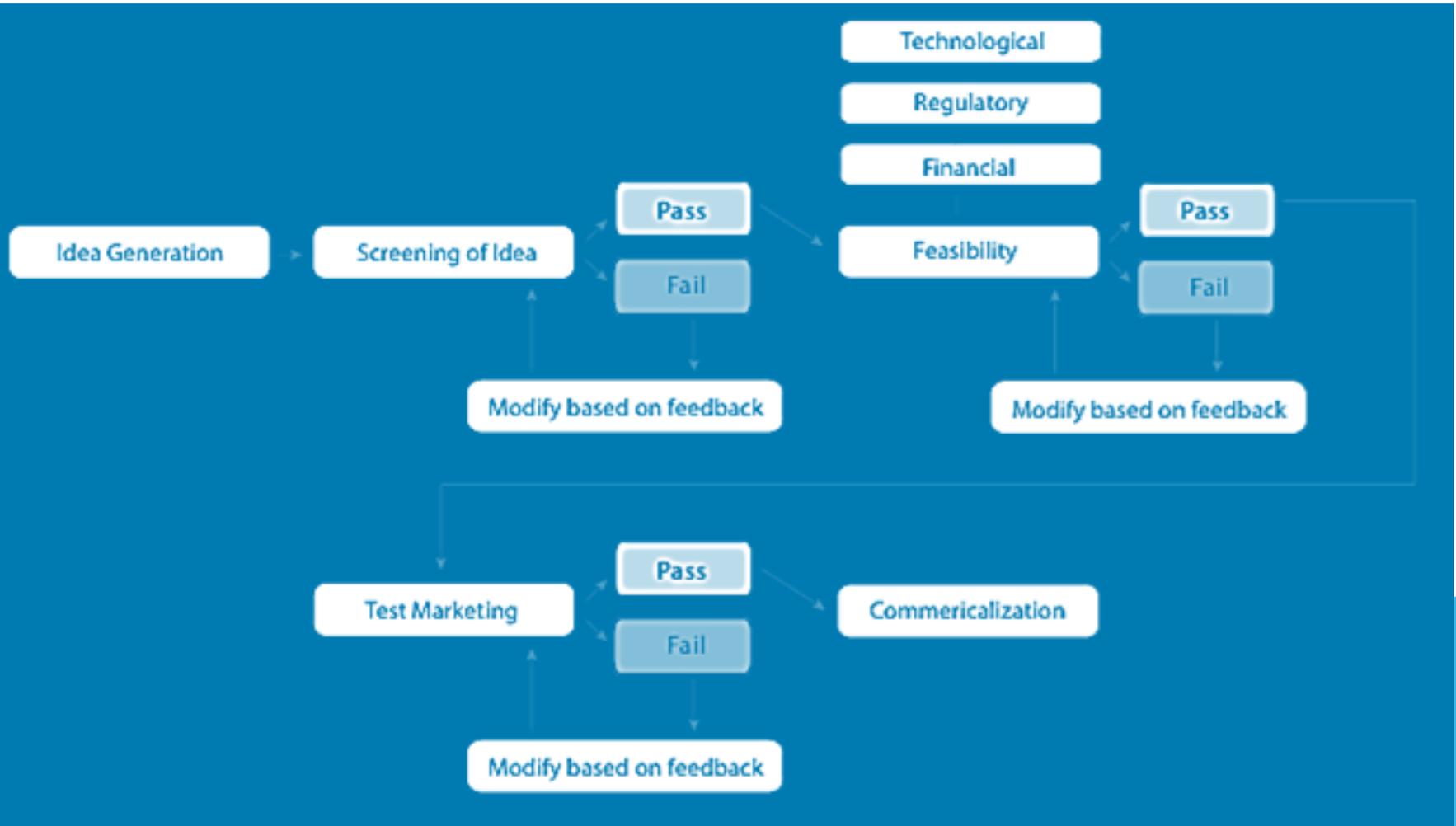
- May rely heavily on outside resources such as:
 - Independent laboratories
 - University researchers

PRODUCT DEVELOPMENT PROCESS

Steps include:

- Idea Generation
 - Create ideas and brainstorm about future projects
- Screening
 - Consumer acceptance of idea, market potential
- Feasibility
 - Can the product be created financially? Within regulations? With existing technology?
- Test marketing
 - Will consumers purchase the product?
- Commercialization
 - Full scale production and marketing

PRODUCT DEVELOPMENT PROCESS



IDEA GENERATION

Techniques include:

- Stage Gate ® Process
- Internal ideation
- Consumer inquiries
- Trends
- Consumer product replication



IDEA GENERATION: INTERNAL SOURCES

Salespersons, marketing team, field representatives

Consumer inquiries

Periodical group meetings



IDEA GENERATION: EXTERNAL SOURCES

Trade shows, conferences, and exhibits

Competition

Market analysis



SCREENING

Check what is already available on the market and then come up with an idea for a new product within a specific category

Ask yourself a series of questions such as:

- Who will use the product?
- How will it be used?
- What preparation is necessary?
- How will the consumer benefit from it?



SCREENING CONT.

Other questions to ask yourself:

- Does it have any other uses?
 - Who is the competition, what price and size are available?
 - How is the product different from the competition?
 - Where will the product be available?
 - How will people find out about the product?
-
- Knock out the competition!?



FEASIBILITY

Addresses three main considerations:

- Regulations

(GMOs, Organic...)

- Technology

(high pressure processing, nanotechnologies...)

- Finances



REGULATORY FEASIBILITY

Local, state, and federal regulations must be followed

- Products crossing state lines are under the jurisdiction of USDA or FDA, depending on product type



REGULATORY FEASIBILITY

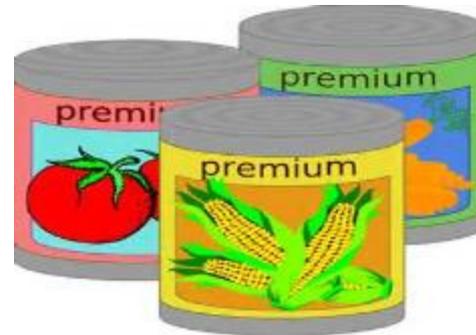
Regulations: what state and/or federal agencies regulate your product?

- If the product is not going across state lines, it is regulated by state agencies
- If you sell your product across state lines, then it comes under FDA or USDA
 - Meat (more than 3% fresh meat) and poultry (at least 2% cooked) products are regulated by the USDA-FSIS
 - Other food products are regulated by the FDA
 - Dept of Commerce involved in fisheries

Heat-processed low-acid canned foods and acidified foods in hermetically sealed containers have special regulations

Health safeguards: adulteration, natural toxicants, food additives, residues and unsanitary processing or holding practices

Economic safeguards: labeling and net contents



STANDARD OF IDENTITY: APPLESAUCE

Standard of Identity

- Guidelines in order label a food as a certain name

Ex. Applesauce

Must have a soluble solids content of at least 9 percent if unsweetened, and 16.5 percent if a sweetener is added...

*Apples should be the primary ingredient of the product, but optional ingredients can include **water, salt, apple juice, organic acids, nutritive carbohydrate sweeteners, spices, natural flavoring, and a color additive.***



USDA FOODS

Meat and poultry products are under USDA jurisdiction include foods that are:

- Over 3% fresh meat
- Over 2% poultry
- Sold in interstate commerce

All other products are regulated by the FDA, with the exception of seafood.



SPECIAL REGULATIONS

Potential for botulism high in hermetically sealed foods

- **Hermetically sealed container**— as defined by FDA in 21 CFR 113.3 (f), “a container that is designed and intended to be secure against the entry of microorganisms and thereby to maintain the commercial sterility of its contents after processing.”

Special care must be taken when processing low acid or acidified foods

- Manufacturers of low acid foods must take an FDA approved course of study referred to as, “The Better Process Control School”



DEFINITIONS OF HERMETICALLY SEALED FOODS

Acid foods—processed foods that naturally have a pH below 4.6 and/or a water activity below 0.85.

Acidified foods—low-acid foods to which acid(s) or acid food(s) are added to reduce the pH to 4.6 or below with an $A_w > 0.85$.

Low-acid canned foods—processed foods in hermetically sealed containers with a pH greater than 4.6 and a water activity greater than 0.85 with the exception of alcoholic beverages.

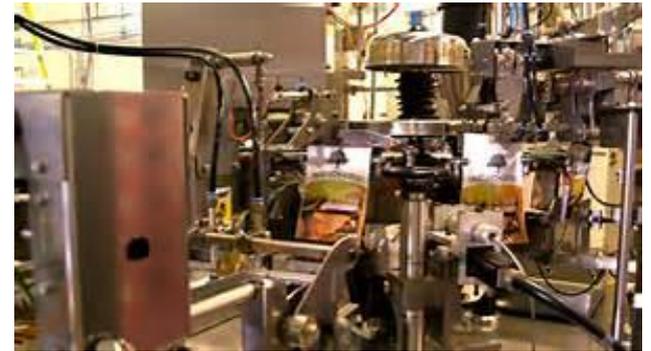
Water activity (A_w)—the measure of the water available for microbial growth in a food



TECHNOLOGICAL FEASIBILITY

Goals are to identify necessary equipment, facilities and processes needed to manufacture the product. Concentrate on the following areas:

- Formula / ingredients
- Processing
- Facilities
- Packaging
- Distribution
- Shelf-Life
- Safety



FORMULATION / INGREDIENTS

Are the ingredients need available or able to be made?

Can a formulation be devised on the bench-top level?

Will the ingredients be available year-round?

Is sufficient quantity of ingredient available?



PROCESSING

Is an existing facility available?

Is the necessary equipment available?

Is the necessary equipment manufactured or can it be manufactured?



Hotel Food Processing Equipment

FACILITIES

Is the water supply to the facility sufficient?

Is the sewage system sufficient?

Can the conditions inside the plant be controlled sufficiently for the product?

- For example, some products are affected by high humidity



PACKAGING

How will the product be marketed and packaged?

What size(s) will the product be sold in?

Will the product be a premium product or a generic grade?

What types of packaging materials will be used?

Will packaging be used to set the product apart from others?



DISTRIBUTION

Is sufficient distribution available?

Will the product require frozen or refrigerated distribution?

Will the product have nationwide or regional distribution?

What will the distribution radius be?



SHELF-LIFE

What will be the desired shelf-life of the product?

Frozen Items	Storage Life*
Coffee, ground, opened	1 month
Bacon, vacuum packed, unopened	1 - 2 months
Ice cream, vanilla, opened	1 - 2 months
Ice cream, chocolate, opened	1 - 2 months
frozen yogurt, opened	1 - 2 months
Ground beef, fresh	3 - 4 months
Pork roast, all cuts, fresh	4 - 6 months
Chicken, fresh	9 months
Eggs, fresh, in the shell	1 year
Rice, brown, frozen	12 - 18 months

* for best quality

SOURCE: StillTasty.com

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Ingredient	Aerobic Plate Count (log ₁₀ CFU/g or cm ²)	Spore Count (log ₁₀ CFU/g or cm ²)
Mixed spices	6.0 - 8.4	5.8 - 7.9
Paprika	7.0	7.1
Pepper, black	8.0	8.1
Pepper, white	5.6	4.1
Sugar	<2.0	<1.0
Starches	<3.0	<1.0
Beef (frozen boneless)	2.5	<1 (est.)
Lamb (frozen boneless)	3.3	<1 (est.)
Pork (chilled carcasses)	2.5	<1 (est.)
Poultry (chilled birds)	3.8	<1 (est.)
Fish (frozen)	3 - 5 (est.)	<1 (est.)
Vegetables (unprocessed)	3.6 - 7.5	<3 - 4 (est.)

SAFETY

What safety risks are associated with similar products?

How will these risks be alleviated in processing and distribution?



FINANCIAL FEASIBILITY

A detailed cost analysis should be made.

Two types of costs to consider:

- Fixed costs: equipment, building, property taxes, and any other item that once purchased will not fluctuate due to changes in production levels



Variable costs: expenditures that vary with the volume of production such as hired labor, raw ingredients, packaging materials, fuel, electricity, utilities



TEST MARKETING

Ask for help from marketing specialists to help plan and interpret the results

Limit your distribution area for a test market

Consumer tests are sometimes conducted as in home tests

Purchasing new equipment at this stage is not advisable

Large companies rely on pilot plants or existing facilities



Sales

- Develop a questionnaire for consumers to evaluate the quality of your product
- Keep in touch with store managers selling your product to determine who is buying it, where is it displayed in the store and how is it holding
- Keep good records of all the details of the market test
- Ask for help to analyze the data to determine whether you should take the next big step



COMMERCIALIZATION

If you want to set up a processing facility, your list of issues to address includes finding a location, building, equipment, plumbing, and personnel

Your product should now reflect any changes that were deemed necessary during the market test

Large-scale production also involves paying more attention to quality and shelf life



Product maintenance should be included in your commercialization step and concentrate on:

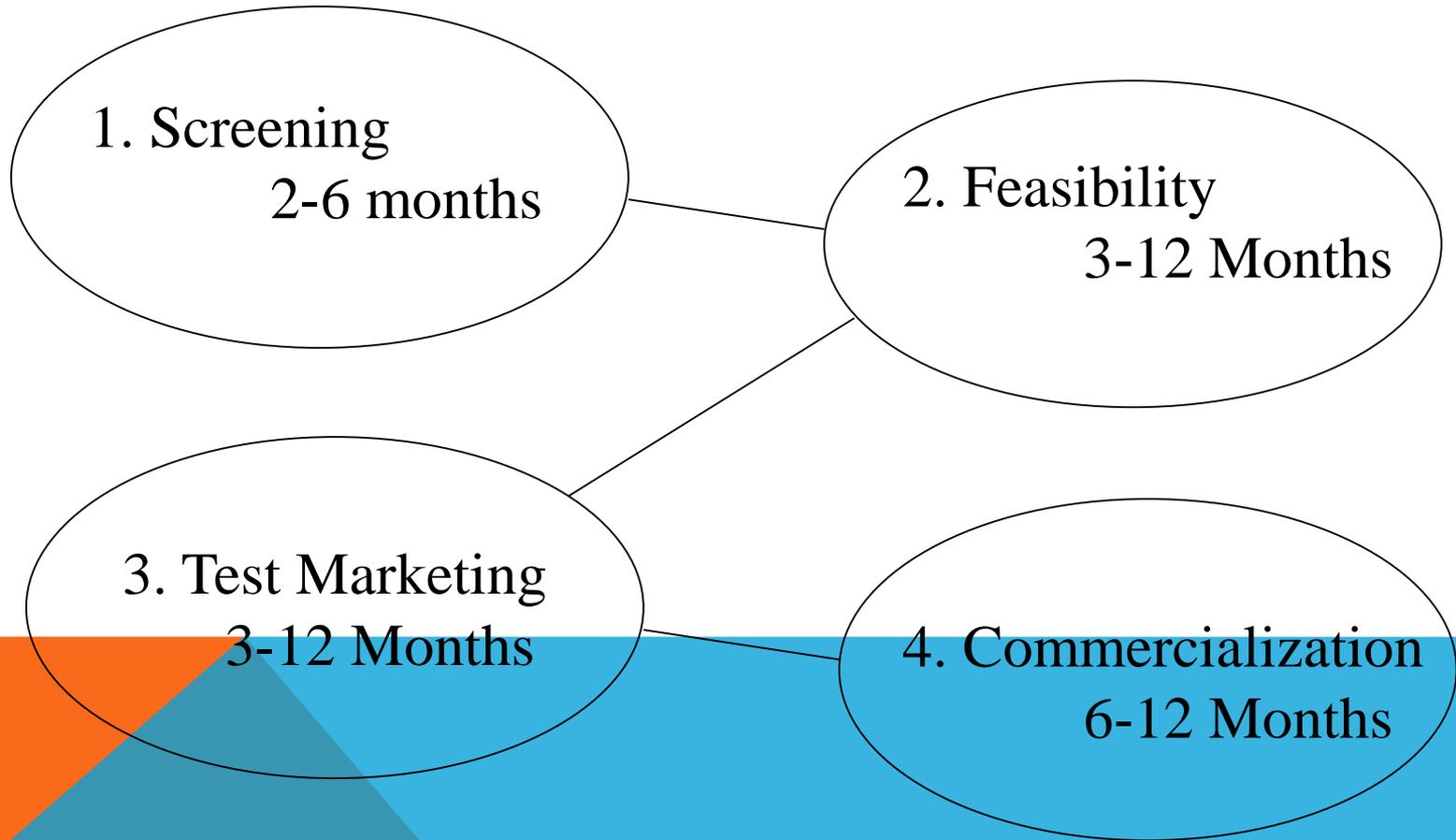
■ Quality improvement

- look for any potential defects in the product as it is handled through distribution and display
- Adjust your formula or processing procedures to remedy the problem
- Solicit consumer response to help identify alternative flavors or packaging

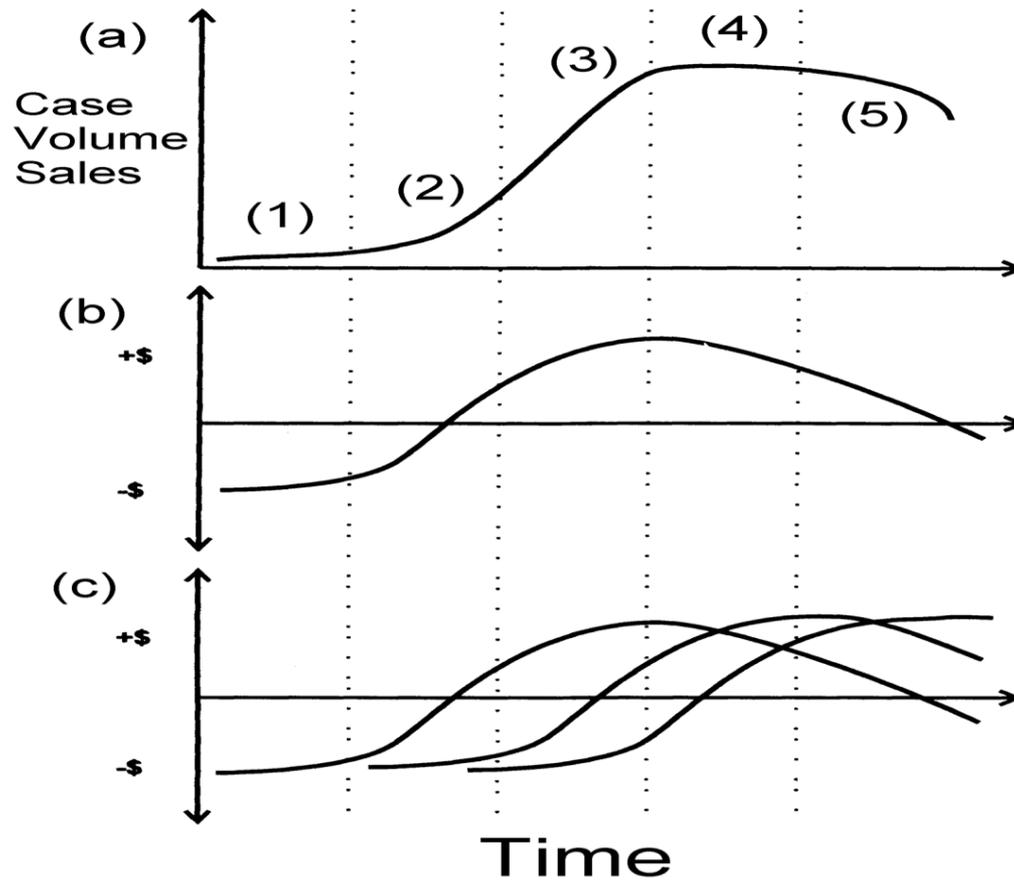
■ Profit improvement

- This will be achieved mainly by cutting your costs rather than raising the product price
- Investigate ways to improve process efficiency, save on labor costs, and find alternate suppliers of ingredients

CREATE NEW PRODUCTS



PRODUCT LIFE CYCLE



PRODUCT LIFE CYCLES

1. Introductory period

- Promotions
- In-store demonstrations
- Coupons
- Heavy Costs
- Minimal profits



PRODUCT LIFE CYCLES CONT.

2. Strong growth period

- Repeat buyers
 - New consumers
 - New markets
 - Continuing costs
 - Improved profits
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PRODUCT LIFE CYCLES CONT.

3. Decline in growth rate

- Less repeat buyers
- New markets are harder to find
- Competition
- New costs
- Better profits



PRODUCT LIFE CYCLES CONT.

4. Stability period

- No growth
- Consumer fatigue
- Stagnating market
- Costs match profits
- Profits start to decline



PRODUCT LIFE CYCLES CONT.

5. Product Decline

- Competitive products
- Promotions too costly
- Declining sales
- Very costly to maintain
- Unprofitable

6. Cease Manufacture



TOP REASONS FOR NEW PRODUCT FAILURE

Expecting too much: be realistic in financial objectives

Inadequate market research: do your homework

Lack of resources: develop a good business plan

External causes: consumer resistance, competition, luck



REFERENCES

Fuller GW. 1994. New Food Product Development: From Concept to Marketplace. Boca Raton, FL: CRC Press.

KSU and Kansas Department of Commerce and Housing. 1998. Reference Guide for Kansas Food Processors.